AMERICAN MACHINIST

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ENTERED AT POST OFFICE, NEW YORK, AS SECOND CLASS MATTER.

New Upright Drill.

The engraving represents the machine made in sizes of 25″ and 28″, by Currier & Snyder, Worcester, Mass.

They have automatic drilling capacity of 22″ and 24″, which is valuable when they are used for boring.

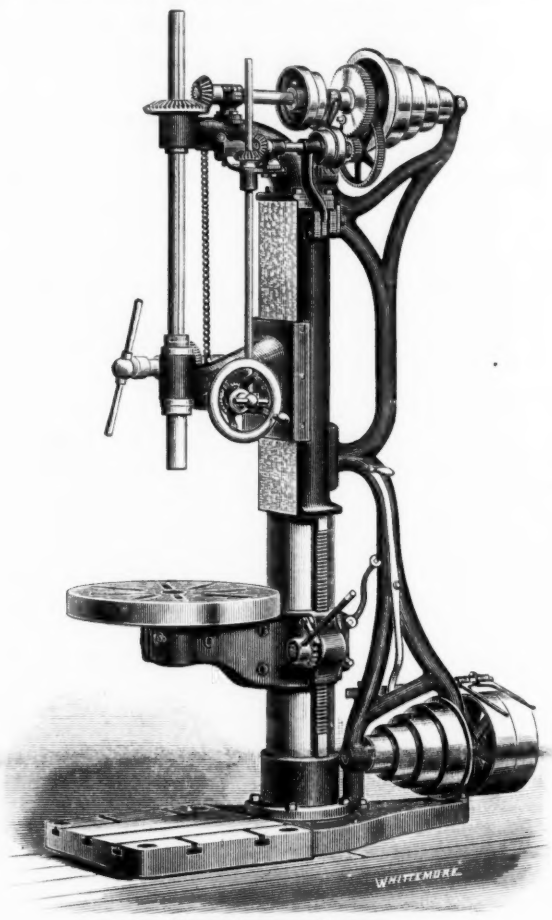
The spindle and head are both balanced by one chain and weight, and by a quick return motion the head can instantly be placed at any desired position on the face of column, without the use of wrench.

Gears and racks are cut from the solid; shafts, spindles and pinions of steel.

The hole in spindle conforms to "Morse" taper, No. 4.

The cones are large and placed as far apart as possible, so that a long belt may be used. Back gears and power feed are always provided unless otherwise specified.

This is an extra heavy tool, with metal well disposed to insure rigidity. The arrangements for operating are very convenient.



NEW UPRIGHT DRILL.

New Lifting and Weighing Jack.

The engravings which accompany this represent the construction of this jack very clearly. As a lifting jack it is an unusually well made tool of its class, while it possesses the additional important feature of being at the same time an accurate weighing machine. To accomplish this last named end it will be seen that the thread or nut in which the screw works is in the outer or upper end of a sleeve or tube, which is free to move up or down in the stand or body of the jack, being loosely guided near its upper and lower ends so as to move in a straight line. At its lower end this sleeve is so connected with a helical spring that all the weight or downward stress, as in lifting, comes on the latter. This spring is held in line with the sleeve by an annular ring on the base plate, and a ball and socket connection between the sleeve and spring prevents side thrust of the latter, by which the sleeve might be cramped in its guides.

The upper end of the screw, or lifting bar is hemispherical, upon which rests the cap-plate, the arrangement being such as to bring the thrust on the line of the axis of the screw, to avoid binding the sleeve. The screw is worked in either direction by a ratchet device, as represented.

It will be understood that a weight or thrust against the end of the screw tends to force the sleeve downwards, and that this downward tendency is resisted by the spring, which is compressed in proportion to the thrust, so that all that is necessary to complete a weighing machine is to provide for registering the motion of the spring and sleeve, to correspond with different weights on the screw, as is done in any spring balance. To this end the stand is provided with a circular dial, suitably graduated motion being had through a small pinion working in a rack on the sleeve. By this means any longitudinal motion of sleeve is represented by a corresponding motion of the dial, and the weight is read from the graduations. A small spring keeps any lost motion between the rack and pinion always taken up in one direction, so that it does not affect the accuracy of the register.

The means employed to perfect the arrangement for weighing, incidentally serve to increase the value of the tool as a jack, reducing friction and making it easier to operate.

The utility of a tool of this kind is obvious. On railroads they may be used for weighing cars, either at loading or receiving stations, where track scales are not at hand, or where it is desirable to avoid moving the car to the track scale. A jack placed under each corner of the car will accomplish this purpose with dispatch. By this means loaded cars at mines, quarries, or lumber yards, can be most conveniently weighed.

In machine shops, foundries, boiler shops, etc., they can be used for weighing machinery, castings, boilers, etc., where no scales are at hand, or where getting the pieces to scales would be inconvenient and costly.

In these respects the arrangement possesses the desirable qualities of a scale that can be readily taken to the place where the weighing is to be done.

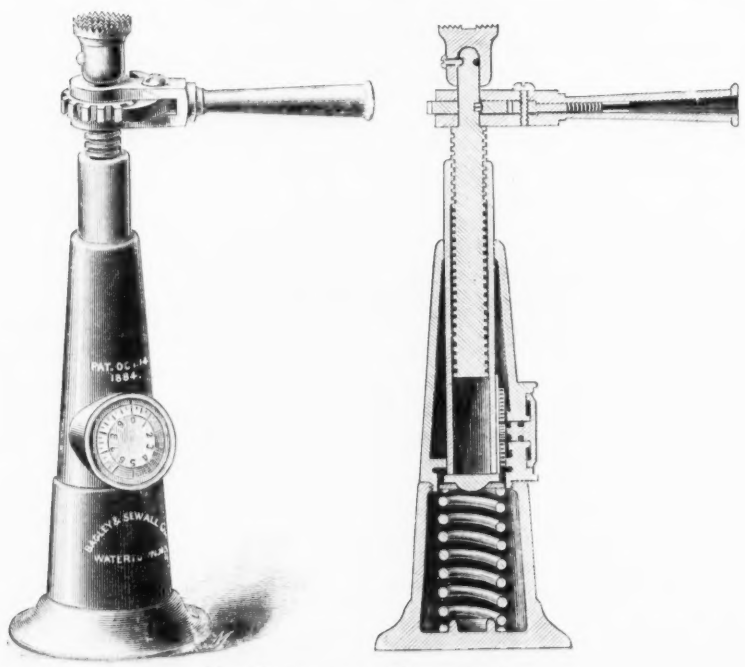
The smaller sizes, for household and agricultural purposes can be used for weighing coal, hay, or anything bought or sold. Wagons, either loaded or unloaded, can be quickly weighed.

For raising buildings they will be found a great improvement over other forms of screw jacks, inasmuch as any number of them may be operated, by observing the dials, so as to evenly distribute the strains. Numerous other uses will be suggested for a jack of this kind.

Great pains is taken in the construction, and with the present knowlege of steel making and spring making, and the severe test to which all springs used are subjected, it is guaranteed that the scale will remain correct in use.

These jacks are made in sizes from 1,200 lbs. to 15 tons capacity, or larger, if required; of course their capacity for weighing is practically unlimited, since any number of jacks may be used to weigh a heavy body—an ocean steamship on the dry dock, if desired.

This jack scale was patented by James Chase of Rochester, N. Y., October 14, 1884. The Bagley & Sewall Co., of Watertown, N. Y., are sole manufacturers.



NEW LIFTING AND WEIGHING JACK.

Filing Bolt Heads—Milling Work—Experience in Drilling.

BY JAMES F. HOBART.

Did you ever finish up a bolt head, or the head of a set screw, which had been planed out on a shaper, or, better yet, cut on a milling machine? If so, what kind of a job did you make of it? Did you work out all the tool marks with a smooth-cut file and leave the corners true and square, or did you rock your hand a little and round all the corners off enough to spoil the job as far as good looks are concerned?

Watch Henry as he files the ½″ square head of that set screw. Does he grab a big file in both hands, rake the work two or three times, and then stop and look at it. No! He picks up a nice 10″ smooth-cut file, and looks at it to see if there are any filings clogged between the teeth. If so, he takes a bit of sheet brass and knocks out the little lumps. He knows that if he scrapes that clogged-up file over his work he will make more scratches than he takes out.

Before putting the file to work he rubs his file card over it, and cleans out all the loose dirt and filings. Now he puts the file to work. He handles it as tenderly as if it were a nice meerschaum pipe or his pet cigar holder. He never abuses a file. He knows that files can get the teeth knocked off if they are smashed around like cobblestones, or cherished in the "catch all" box on his bench. Henry takes the file up with his right hand and lays it on the work, then, with the thumb and fingers of his left hand, he works the file to a bearing on that screw head. He don't push the file a bit until he gets it down solid on the work. Now he works it. No long haphazard strokes there. Only one or two inches of movement to the file. That file don't move out of its plane. The tool marks are all taken off alike, and the corners kept whole.

Henry has filed four sides of three bolts while we have been telling about it. He can finish up a screw head in less time than it takes a bungler to spoil it, and he don't work half as hard, either.

That milling machine is a big thing in a shop, and folks are beginning to find it out. Some shops don't find it so until the old folks die off and their sons begin to run the concern. Just figure up the saving of time and power in squaring up Henry's set screw head. The old chaps with their planer would need fifteen minutes to get ready in, twenty minutes more in which to plane each side of the square head, and, after planing, the job needs sizing up by hand.

Henry put two cutters on an arbor with a ½" collar between them. He screwed that bolt in the milling machine vise, run the cutters over it once, revolved the vise 90°, another cut, and the job was done. Time, fifteen minutes.

As above stated, every shop don't have a milling machine; but by making a few little jigs, lots of milling work can be done in a good screw-cutting lathe.

Every shop can have a dozen good stout arbors rigged with collar and nut, and every shop can have two dozen good cutters. We don't want those things that you have been in the habit of calling "milling cutters." They are only a concentrated abomination, and you say: "Oh, yes; that looks very fine on paper. We have got some arbors and cutters now. We have always had some, but they don't amount to anything." And you bring out a ¾" arbor about 15" long, with a collar shrunk on near the middle of its length, a thread cut down 3" from one end, and the rattling piece of iron thereon you call a "fitted nut."

Put the concern in a lathe and see how it runs. How it wobbles. Makes you think of a young eccentric for a steam engine. Such limber arbors are no good. You try to use one of them, and you get along about as well as did the emery grinding machinist, or the soldering chap. What's the reason? You don't know how, and with the old rigging you have got you don't care to learn; and what's more, you can't.

Put your old cutter on a nice stiff arbor, and put it to work. Just listen as it comes up to the iron. "Check, chuck, c-r-e-e-e-p!" goes the cutter as two teeth get a bite, and then the big side of the cutter gets around; can't cut fast enough, and the arbor springs to let it get by.

Perhaps that cutter was round once when it was in a solid bar of steel, but very likely then it was "hex" or "eight square," and that was nearer round than it is now. The hole in your cutter is oval. The cutter itself is oval, twisted and spurry. It "pitched" away when you hardened it, and you didn't know anything about grinding the cutter after it was tempered.

Go to a shop that uses a big universal milling machine. Get in a corner out of the way, sit down on a keg of washers and watch with your mouth shut. Notice the man who is running the concern. You think he can kill time to perfection. All he does is to bolt castings to the table of that machine and then start it up. He has got a box on there now. It is a little concern, weighs about 3 lbs. He is finishing the part where it bears on and is bolted to the frame of the machine. It consists of two planes intersecting at an angle of 90°. One surface is 3"x3"; the other, 3"x¾". On a planer it would be a nasty little job. A shaper would have to be watched, and changed from horizontal to perpendicular feed at the angle. With the lazy milling man, it is different. He put a big knee on the slotting table; put in a 4" cutter which was flush on one side, started the machine, and took up the next job. He didn't care anything for the machine until it stops cutting. He gives his whole attention to planning his next cut. He gets out the requisite cutter. Gets the vise, if needed, and has everything ready to clap together when the machine gets through its present cut. It makes you feel tired to think of your little screw planer doing such work. You remember how it "stuttered" when it stopped at the end of the cut, and how it stopped "ke-bang" at end of the return stroke. You make up your mind that small planing jobs are "played out," and if you can't have a milling machine, then you will have a shaper any way and will rig up a lathe for a milling machine.

Lots of jobs can be done with a lathe milling machine. Make a little vise to bolt to the slide rest. If you have got a lathe on which the back end of the slide rest can be raised and lowered by a screw, then put your milling rig on that lathe.

You can make lots of jigs to save time and to turn out good work, but the first thing you do, make your arbors and cutters run true. Do that or you never will do anything with a make-shift milling machine.

The other day we found a chap in a peck of trouble over a drilling job. He wanted to drill a 1" hole where there already was a ½" hole, and the extra half inch must all be taken from one side. One chap tried a flat drill, drove a plug into the ½" hole, and began operations. For half an inch it went all right, then the plug slipped, turned half around and the drill broke. He tried it again. No use, the drill would break or run every time. Next he got a twist drill and started that. No use, the hole was not straight.

The next time our chap tried this job, he got a "hog-nosed" drill. It was a half round concern, with a peculiar kink in the cutting lip, and will walk right through a piece of iron in exactly the direction it is started. You can't start one of these drills in a piece of iron unless you clamp on a template, but get once started and it will walk right through blow holes, cracks, or smaller drill holes without running or breaking if it is decently used.

Some locomotive shops use these drills and think they could not get along without them, but lots of shops never heard of them. Try one. It will work right every time if you get the right shape to the cutting lip; that is the particular point to be looked after in making a "hog-nose."

Tapers for Lathe Spindles and Drill Shanks.

Recently we sent an inquiry to quite a a number of machine tool builders asking "the taper, per inch or foot, of holes in spindles of lathes and drills for centers and drill chucks." Over fifty replies were received, and we present them herewith. The tapers vary from 1½ to $\frac{11}{32}$ of an inch per foot.

P. BLAISDELL & Co., Worcester, Mass: We have never followed strictly any particular taper for our centers, except to keep each particular size lathe to the same taper to avoid confusion, but upon examination we find that our centers are about ¾" to the foot: that is, the small end is ¾" smaller than the large end, one foot in length. Our drill taper is the Morse twist drill taper for their drills.

PRENTICE BROS, Worcester, Mass.: The holes in the spindles of our drills and lathes are made to conform to the Morse twist drill taper for the reason that so many of their tools are sold to go with ours. We saw, not long ago, a communication in the MACHINIST regarding the matter you mention, and no doubt you can determine the taper per inch or foot, from the fact that we use the Morse taper.

BRAINARD MILLING MACHINE Co., Hyde Park, Mass.: We have never adopted any exact system, for each of our machines have taken great care to keep the size interchangeable so that mill arbors made to-day will fit the taper holes of same size machines. Our average is about $\frac{3}{16}$" to the foot.

F. E. REED, Worcester, Mass.: I use as a standard for the taper for all engine lathe centers $\frac{6}{10}$ inch to the foot. I am glad you have this question under consideration, and should be more glad to see a standard adopted by all makers of machine tools.

THE AMERICAN MACHINE AND TOOL Co., Boston, Mass.: We bore our tapers $\frac{1}{16}$ of an inch in one inch, or ¾ of an inch to one foot.

J. F. BLAIR & Co., Philadelphia, Pa.: Our taper for lathe centers or drill chucks is $\frac{5}{100}$ of an inch, per inch.

ISRAEL H. JOHNSON, JR, & Co, Philadelphia, Pa.: The taper of center holes in spindles generally used is ⅝" to 1 foot. Different makers use different tapers. We very seldom find them alike, except where the Morse twist drill taper is used.

WARNER & SWASEY, Cleveland, O.: On starting business, we adopted ⅝" to the foot as being the nearest correct that we could learn. We regret that there is no standard that all manufacturers can adopt, for uniform standands would be a great convenience.

HEWES & PHILLIPS IRON WORKS, Newark, N. J: Our practice for taper holes in spindles is to give them a taper of ⅛" to the 1". We have found this rule to be both a safe and satisfactory one.

NEW HAVEN MANUFACTURING Co., New Haven, Conn.: The holes in all our drill spindles are reamed out with a Morse No. 4 taper reamer, and the taper to that is about ⅝" to the foot. In our lathes the tapers vary with the swing of the lathe: 18" swing ¾" to foot, 26" and 30", 1¼" to foot, etc.

BROWN & SHARPE MANUFACTURING Co., Providence, R. I.: We have used for many years a taper of one-half inch per foot in all center holes for whatever purpose used. We have a series of reamers, sixteen in number. The smallest, or No. 1, is two-tenths inch (.2 in.) in diameter, and the No. 16 is 2½ inch. diameter at small end. We would be pleased to give you any further information you may desire.

MCFARLAN & NOTTINGHAM, Cincinnati, O.: We make the holes of our drill spindles to suit the taper on shanks of the Morse twist drill. The holes in spindles of our lathes are tapered ⅝ of an inch to the foot.

EDWIN HARRINGTON, SON & Co., Philadelphia, Pa.: We use the Morse Twist Drill Co's taper, as used on their sockets, both for drills and lathe spindles.

BEMENT, MILES & Co., Philadelphia, Pa., Our taper for drill shanks, in seven sizes running up to 2½ inches diameter, is uniformly ½ inch diameter per foot in length. For lathe centers of all sizes it is ¾" per foot.

FITCHBURG MACHINE WORKS, Fitchburg, Mass.: The taper of our lathe centers is ⅝" per foot.

A. L. WRIGHT, Lowell, Mass.: I find after some years' experience, that one-half inch to the foot for a taper for the hole in spindles for lathes and drills will work more satisfactory, as a rule, than either more or less taper.

G. W. DAVIS, Nashua, N. H.: The taper for centers to lathe and drill made by us for nearly these thirty years, has been $\frac{9}{16}$ in. to one foot. We still like the taper. There are some that use as much as $\frac{15}{16}$ in. to one foot.

W. F. & JOHN BARNES Co., Rockford, Ill.: In all of our lathes and drills we are using the Morse taper, and we believe that it would be a very excellent thing if all the manufacturers of these classes of tools would settle upon the same. We think it would be a very desirable thing to secure uniformity in this respect.

GAGE MACHINE WORKS, Waterford, N. Y.: In reference to tapers for lathe spindle centers, our rule is ½" to 12".

F. C. & A. E. ROWLAND, New Haven, Conn.: We make the taper on lathe centers, etc., ½ in. per foot.

THE SIGOURNEY TOOL Co, Hartford, Conn.: We have adopted the Morse taper, supposed to be ⅝" to the foot.

G. A. GRAY, JR, & Co., Cincinnati, O.: We have always used ⅝" to ft. taper for lathe centers and drill sockets.

WILLIAM GLEASON, Rochester, N. Y.: I make taper of centers for lathes up to 24 in. swing ⅝ in. per foot; from 24 in. swing to 52 in. swing ⅞ in. per foot.

THOS. H. DALLETT & Co., Philadelphia, Pa.: In reply would say that, in machines manufactured by us we use the Morse taper as a convenience in the use of their twist drills.

THE STAR TOOL Co., Providence, R. I.; We use reamers of ¾ in. taper per foot for our regular work.

NILES TOOL WORKS, Hamilton, O.: The taper of holes in spindles of lathes, according to our practice, is $\frac{1}{16}$ of an inch to an inch. The holes in the drills are all made for Morse taper sockets.

THE BALLOU MANUFACTURING Co., Hartford, Conn.: We believe the usual practice among tool-builders is to make the tapers $\frac{9}{16}$" to the foot. As nearly all of our work is light, we have adopted the watch factory plan of making the tapers to degrees. Our tapers are made 3° or 1½° on each side of the axis. We find this system much more convenient than the former.

AMERICAN WATCH TOOL Co., Waltham, Mass.: We don't use the expression "taper per inch," but rather "2° taper"—*i. e.*, we set our rest at 2°, and make a taper whose sides are 4° with each other. Our tapers are "2° taper." The American Watch Co. use "1½° taper." Our tapers increase in diameter .838" to the foot.

W. C. YOUNG & Co., Worcester, Mass.: We use the tapers made by the Morse Twist Drill Co. for all our lathe and milling machine centers. On our small hand lathes this is a good selling point, as a certain class of customers think they can use the taper shank drills without the expense of a special socket. Of course, this does not do the lathe spindle any good when a drill slips, as it will more or less, with Nos. 1, 2, 3 & 4.

BETTS MACHINE Co., Wilmington, Del.: In lathe spindles the holes for the centers taper about ½" to the foot. In drill spindles the taper is the same as the Morse taper.

FLATHER & Co., Nashua, N. H.: We use the American taper for centers on our lathes—$\frac{9}{16}$" per foot.

BRIDGEPORT MACHINE TOOL Co. (E. P. Bullard, proprietor), Bridgeport, Conn.: Our standard taper for lathe center, etc., is one-half inch (½") to the foot.

FAY & SCOTT, Dexter, Me.: We use the Morse Twist Drill Co.'s reamers for centers in all our tools. We would add that we are well aware of the fact that this is not the best in every respect that could be done, but we accept it as the nearest that we can get to a standard. I do not think it at all creditable to tool-builders of this country that they have not ere this adopted some uniform and standard taper for this purpose, and all use it. We not only use this taper on tools that we build, but we rebore our other tools where practicable, and find it a great gain when we make a tool of any kind to fit one of the lathe centers to be able to put it into the drill press, planer centers, milling machine, etc.

S. FREEMAN & SONS, Racine, Wis.: We use the "Morse" taper in all drills and other machine tools manufactured by us.

H. L. SHEPARD, Cincinnati, O.: My rule for tapers in lathe spindles is $\frac{1}{16}$" to the inch. On drill presses I use the Morse taper.

WILLIAM SELLERS & Co, Philadelphia, Pa.: It is our practice to make the holes in lathe and drill press spindles of a uniform taper of ¾" in diameter per foot in length. All drill shanks are splined, and drill chucks and drill press spindles are provided with a key to insure adequate driving surface for rotation of drill.

CURRIER & SNYDER, Worcester, Mass.: We use nothing but the Morse reamers.

POND MACHINE TOOL Co., Worcester, Mass.: We have adopted as a standard, viz.: lathes, 1 inch to 1 foot; drills, Morse standard taper.

S. ASHTON HAND MANUFACTURING Co., Toughkenamon, Pa.: The taper we have adopted for lathe spindles is 3°, or nearly ⅝" per foot. We use degrees because the taper thus obtained is readily measured by protractors. Would be glad if the A. S. M. E. would adopt a standard. We don't make drills, but think the Morse taper should be used for them.

HENDEY MACHINE Co., Torrington, Conn.: We use the Morse standard reamers for all spindles of lathes, drill presses, etc. We consider them the best and cheapest for the purpose, and the taper holds well.

GEO. A. OHL & Co, Newark N J: We

use the taper reamers of the Morse Twist Drill Co. to have our tapers suit their drills, which are standard and in general use.

E. GOULD & EBERHARDT, Newark, N. J.: For some years past we have adopted the Morse tapers for all lathe centers, drill spindles, etc., in order to have a uniform system and a standard. We also use the U. S. standard regarding nuts and bolts. We often wish the machine bolt-makers would have a standard hex. head for each size bolt, and then a standard wrench could be adopted.

W. W. OLIVER, Buffalo, N. Y.: We are not making drills at present, but in our bench and foot lathes we build, we use the Morse taper.

NARRAGANSETT MACHINE CO., Providence, R. I.: We use the Morse taper, as made by the Morse Twist Drill Co. We do not consider it an ideal taper, but we adopted it because it was more generally used than any other. We should prefer a uniform taper. That a uniform standard should be generally used is a consummation devoutly to be wished for.

CHAS. A. MANN, Providence, R. I.: The taper per foot in my work is $\frac{11}{32}$".

PUTNAM TOOL CO, Fitchburg, Mass.: Our standard taper for lathe centers is $\frac{5}{8}$" to 1 foot. For drill sockets we use the Morse standard.

J. A. FULLER & CO., Worcester, Mass.: The taper of holes in the spindles of our engine and speed lathes is $\frac{3}{4}$" to the foot, or $\frac{1}{4}$" to every 4 inches. We use a reamer of just that measurement in our spindles.

W. P. DAVIS, North Bloomfield, N. Y.: We make all our drills to fit Morse taper, as we think it standard. We make but few lathes (only for special work), and have no standard rule on these tools, but make them as, in our opinion, is best for the particular machine.

H. B. SMITH MACHINE CO., Smithville, N. J.: Our taper holes in spindles of lathes and drills for centers is $\frac{1}{2}$" to the foot.

PUTNAM MACHINE CO., Fitchburg, Mass.: The taper of our lathe centers is $\frac{3}{4}$" to the foot. We are using the Morse drill shank taper for all other work.

SWEETSER & MERRITT, Brockton, Mass.: We use the regular Morse Twist Drill Co.'s taper reamers for all our work.

GEO. L. FAIRBANKS, Worcester, Mass.: My taper for centers is $\frac{3}{4}$" to the foot.

W. H. EDDY, Worcester, Mass.: My lathe tapers are $\frac{7}{8}$" and $\frac{3}{4}$" to the foot.

JONES & LAMSON MACHINE CO., Windsor, Vt.: For our gang drills we have adopted the Morse taper.

There is being built at the Tabize works in Belgium a monster locomotive which will figure at the Antwerp exposition. This engine will be the heaviest and largest that has ever been constructed since the establishment of railroads. It will have ten wheels of more than a yard in diameter, and will weigh, in running order, over 82 tons.—*Boston Commercial Bulletin.*

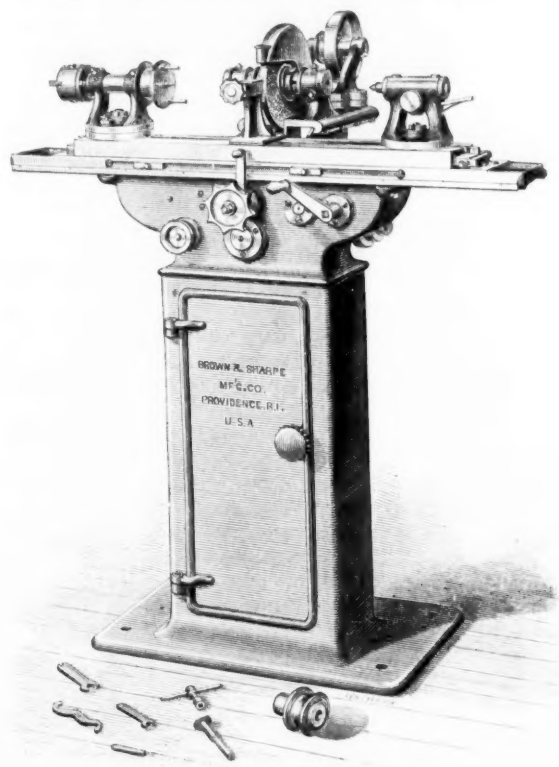
It is possible now to obtain a patent in the Sandwich Islands. Claims must be put in within one year from the earliest issue in any other country. The term for which a patent is granted is 10 years. The law governing the proceedings is much the same as in the United States.

A conductor on the Chicago, Rock Island & Pacific Railroad, was injured in 1883 by the train he was on running into another, the accident not being due to any neglect on his part. He was unable to work regularly thereafter, and was discharged by the company. Finally he sued the company, and it being proved to the satisfaction of the jury that he had sustained permanent injuries, they brought in a verdict of $25,000.

It has been decided to re-open the New Orleans Exposition in November next, to continue through the winter. Citizens have subscribed liberally.

New Grinding Machine.

The Brown & Sharpe Manufacturing Company, Providence, R. I., has recently brought out a grinding machine, smaller than the well known "Universal Grinding Machine" of their manufacture, but having some of the more important points of their construction, and of capacity sufficient to do the work required upon the many small tools, and parts of machines which are to be found in any workshop. Provision is made for grinding tapers as great as 1½ inches per foot, or an angle of 3 degrees upon the outside

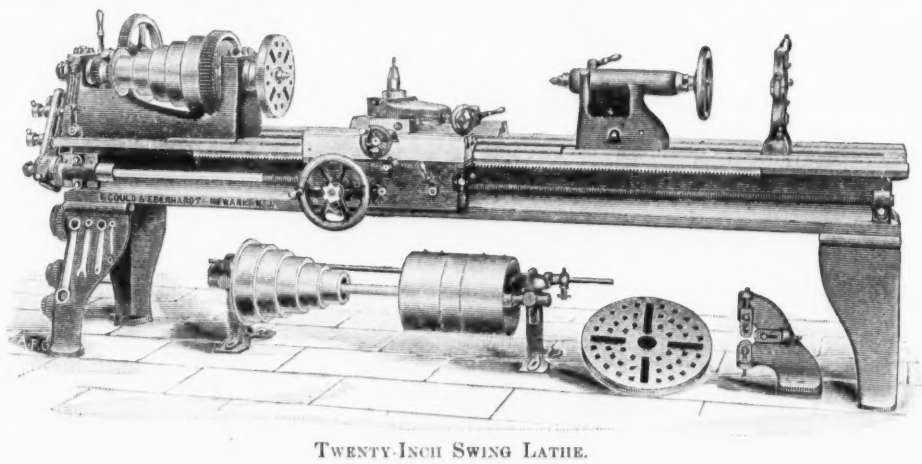


NEW GRINDING MACHINE.

of pieces held upon centers, or by means of a chuck upon the spindle. Holes, either straight or taper may be ground, the spindle carrying the emery wheel being arranged to receive at one end small arbors upon which emery wheels as small as ¼ inch or less may be placed. The machine has a capacity to take 18 inches between centers, and to swing 8 inches over table. The feed-works and all bearings are well protected from dust, and provision is made for using water upon the wheels or work when necessary. Overhead works and all needed wrenches are furnished with the machine.

New 20-Inch Swing Lathe.

The lathe represented in the engraving is made by E. Gould & Eberhardt, Newark, N. J. The intention of the builders is to make a solid, strong, and substantial tool.



TWENTY-INCH SWING LATHE.

The cones carry a 2¾" belt, and with back gears give ten gradually increasing speeds.

The spindle is 2¾" diameter and 5" long in the front bearing; it is forged with collar from a single piece of steel, giving large surface bearing for face-plates and chucks.

The gearing in the head is so arranged that with the regular change gears furnished a screw as coarse as one thread in 6" may be cut, and from that down to the finest pitches.

The tailstock is heavy, with large bearing on V's; it is held down by one large bolt.

The carriage has automatic horizontal and cross-feed in apron, with reverse motion for both; the apron gearing is simple and strong.

A simple arrangement for tripping for all threads is provided, which does away with the necessity for backing belt.

The bed is made with the "Eberhardt" hollow center rib, which is found to add greatly to the strength.

Notes of the Mechanical Engineers' Meeting.

Mr. Walker called the attention of the Society to the fact that cast-iron manholes in boilers are not as safe as those of wrought iron. Cast-iron manholes contract and expand unequally with the wrought-iron plates to which they are riveted, often causing them to crack. Some boiler explosions can be attributed to this trouble. He said wrought-iron manholes are universally used in England, but he had never seen one in this country.

A question as to the proper relation between surface speed of a bearing and pressure it will sustain, led to considerable talk about bearings, without eliciting any direct answer.

The question was too broad. So many elements were to be taken into account, that what would be a good rule to follow in some cases would not apply in others.

Mr. Hamilton mentioned how he had often prevented bearings from heating. He took a mill saw file and draw-filed the bearing in lines parallel to axis of the shaft. This served to retain the oil between the surfaces. Mr. Bancroft had had the same experience. Mr. A. H. Emery mentioned a case where a bearing had been ground as smoothly as practicable on a solid emery wheel. It was tried and then *polished* on an emery wheel with the result of reducing the co-efficient of friction from 30 per cent. down to 3 per cent., other conditions being the same.

Mr. O. Smith gave journals a scrape fit to prevent them from heating. Prof. Sweet said, in referring to remarks of several members, that the matter of heating depended upon how well the bearings were fitted, that he would not advise any of them to use cast iron journals in cast iron boxes on steam engines, no matter how well they might be fitted.

Mr. Durfee mentioned a bearing for a shaft 14 inches diameter which gave trouble by heating. The brasses were then made hollow, and water circulated through them keeping them cool, thus preventing further annoyance.

Humor at the Mechanical Engineers' Meeting.

In describing the various methods of policy and persuasion adopted by him when a young man, to worm out industrial secrets and superstitions from an old gunsmith, Howell Green announced as the last and most successful move of all, "And finally, as a last resort, I sparked his daughter!" He obtained the desired knowledge.

Oberlin Smith thought the Mammoth Cave of Kentucky would make a splendid railroad tunnel, if only some means could be devised for straightening it out.

Speaking of mechanical engineers, as he had observed their characteristics and methods of boring for knowledge, during their three days' stay at Atlantic City, a local statesman remarked at one of the social meetings, he was persuaded, if the theory of evolution be true as formulated by modern scientists, that the original progenitor of the genus mechanical engineer, could be, must be, none other than the Jersey mosquito.

Referring to the failure of a machinery firm, in which a certain financial concern that had been backing the establishment for some time, appeared to have been well taken care of, a member observed that the firm's method of doing "business," viz., buying goods and selling at unremunerative prices, had been "robbing Peter to pay Paul," to use a familiar phrase.

Another observed that it was even doubtful whether they had paid Paul. "Fact is," said he, "all the twelve apostles seem to have been robbed, except the one that carried the bag!"

"I notice," said a member after the very interesting discussion on educating mechanical engineers, "that the men who have no sons, and are not likely to have any, talk the most about 'what we shall do with our boys.'"

Notes of Co-operative Manufactories.

The Wampum Co-operative Wire Company, of Wampum, Pa., has completed its new works and begun operations. The capacity for the present will be about 25 tons a day. It is said that sufficient orders are already on the books to keep the mill running double turn for at least ten months.

The bakers of Brooklyn, N. Y., are about to start a co-operative bakery.

A lot of stove moulders of Easton, Pa., are about to organize a co-operative stove foundry.

We have frequently noted the fact that Mexico was not a particularly desirable place for locomotive engineers. Ira Johnson, an American engineer, was confined 11 months in a Mexican prison, awaiting trial for killing a man on the road on which he was running, there being no evidence that he was in any way to blame in the matter. If what he says of the action, or want of action, of the American Consul is true, there is a good opportunity for a "removal for cause." Engineers will do well to stay away from Mexico. In case of an accident the most usual course appears to be to hang the engineer, on general principles, as it were. This may be a simple way to dispose of such matters, but it is a way calculated to keep out the kind of men needed in Mexico.

Special Boring Machine.

We illustrate herewith the Niles Special Boring Machine, designed as a companion machine to the pulley turning machine illustrated in last week's issue.

The machine is upright, with horizontal table, driven by accurately cut gearing. Double-ended cutters are used. A pulley is very quickly set on the horizontal face-plate. The double-ended cutter, it is claimed, makes a very true and accurate hole. This machine, with that illustrated previously, forms a complete set for boring, turning, and polishing pulleys. The machines are so simple and easily understood that any man of ordinary intelligence can operate them. The practice is for one man to run both machines. In this way the pulley lathe can be kept constantly busy. Any time that may be lost between the machines is lost on the pulley borer, as it has a capacity considerably in excess of the pulley lathe.

These boring machines are adapted to a very wide range of work, and can be advantageously used on a great variety of general machine shop boring. They will accomplish such work very cheaply. To adapt it to this range of work the machine is provided with a large cone having six steps for 4″ belt. Holes as large as 12″ diameter may be bored accurately. In some cases parties are using this machine for boring small cylinders with good success.

The machine is built by the Niles Tool Works, of Hamilton, Ohio.

The Lackawanna Iron and Coal Company commenced boring some three years ago for water to use in their works. It was the opinion of geologists that water would be found in abundance at the depth of 1,000 feet, but when this depth was reached there were no indications of water. The boring was kept up to a depth of 2,100 feet, where water was found, which flowed to the top, but in very small volume. It was about concluded to abandon the well, but the engineer who had the boring in charge insisted that there was plenty of water, which rose to a soft stratum through which the drill had passed and flowed off. By his persistence he prevailed on the officials to allow him to tube the well to a depth below the soft stratum. This was done, and an 8-inch stream of water was projected to a height of several feet above the top of the well.

No method has yet been discovered, it would appear, for removing obstructions from pneumatic tubes, preferable to that resorted to in Paris, its location being determined by simply firing a pistol into the tube. The resulting wave of compressed air, traversing the tube at the rate of 1,000 feet a second, strikes the impediment, and is then deflected back to its origin, where it strikes against a delicate diaphragm, its arrival being recorded electrically upon a very sensitive chronograph, on which also the instant of firing the pistol has been recorded previously. The wave of sound on reaching the diaphragm, is recorded, and then reflected back, a second time striking the obstacle and returning to the diaphragm. This operation being several times repeated, several successive measurements are thus made of the time required by the sound wave to traverse to and fro within the pneumatic tube. Other means have been applied to the accomplishment of the object in question, but this has proved itself to possess special advantages.—*The Engineer and Iron Trades Advertiser.*

Impressions of the New Orleans Exposition.

BY OBERLIN SMITH.

Having just returned from a somewhat extended tour through the South, including a week's sojourn at what is technically known as "The World's Industrial and Cotton Centennial Exposition," I will here record a few casual impressions of that much maligned institution, without, however, attempting a detailed or systematic description of the exhibits. Having seen much in the Northern papers regarding the general mismanagement and almost failure of this great show, I was very agreeably disappointed at finding an exhibition in some respects superior to our "Centennial" of 1876, although, of course, as a whole, not attempting to reach nearly to the grandeur of that occasion. The national exhibit and several of the state exhibits in the Government building were in many respects even superior to the Philadelphia display, as also were some of the machinery exhibits. The Art Gallery was vastly inferior, while the agricultural and horticultural departments, although very good, were much smaller than at Philadelphia. The foreign exhibits, with the exceptions of Mexico and Belgium, were almost *nil*. The general exhibits in the main building, although covering a great deal of ground, were somewhat thinly spread out and were not equal in quantity or quality to those at Philadelphia, while the general impression of the visitor, as he spent hours in passing through the innumerable aisles of this vast pavilion was that it was rather too *bazaarish*, with too much clap-trap in the way of fancy soap and ornamental perfumery. He finds here also somewhat of a redundance of oriental booths for the sale of multitudinous bracelets and napkin rings, all, it is needless to say, made of the wood of the true cross and the cedars of Lebanon. These booths were, of course, presided over by genuine natives of the Holy Land, who have been absent from the old clo' stores of the Bowery long enough to have learned the awkward use of a fez and a puffy dressing gown and trousers.

A very interesting exhibit to eastern people was the saw mill department, which was in a separate building back of Machinery Hall. Here were shown various systems of rapid lumber cutting in use in the Northwest, mostly by large circular saws. There was considerable rivalry in the matter of speed between the different firms represented, and the rate at which the boards were ripped off, was certainly astonishing, although I have not at hand exact data concerning the number of feet cut per minute. The quick return mechanism upon the automatic carriages of these machines, is started so rapidly as to almost throw the operator from his feet while mounted thereon, unless indeed he stands with his legs well braced.

The machinery department, in general, of this exposition was of about the same quality as we see at our other great fairs, with nothing shown of remarkable novelty. The things to which a Northern man is least accustomed were the huge cotton compresses and the cotton-seed oil machinery; this latter was somewhat intricate and very massive and expensive. Much of it was made in England, where they seem to have paid more attention to working out the necessary details than in this country.

A quite noticeable feature in this exposition was the immense amount of shafting, in all about 11,000 feet, extending in six lines, some of which were nearly half a mile long. As might be supposed this was not nearly all utilized, and the greater portion of it was running to waste, so to speak. An engineer's attention would be at once excited by observing the amount of this shafting unoccupied by pulleys and extending over floor spaces on which were piled grind-stones, fancy tiles, bags of salt, baking powder exhibits, locomotives, palace cars, mowing machines, and a host of other articles, which should have been placed entirely away from the power department of the building. In some cases the eye might run along fifty or a hundred feet of heavy shafting and find it giving out but a few cat power, in the way of revolving the reel of a reaping machine or a large model of a revolving oven, or some analogous mechanism.

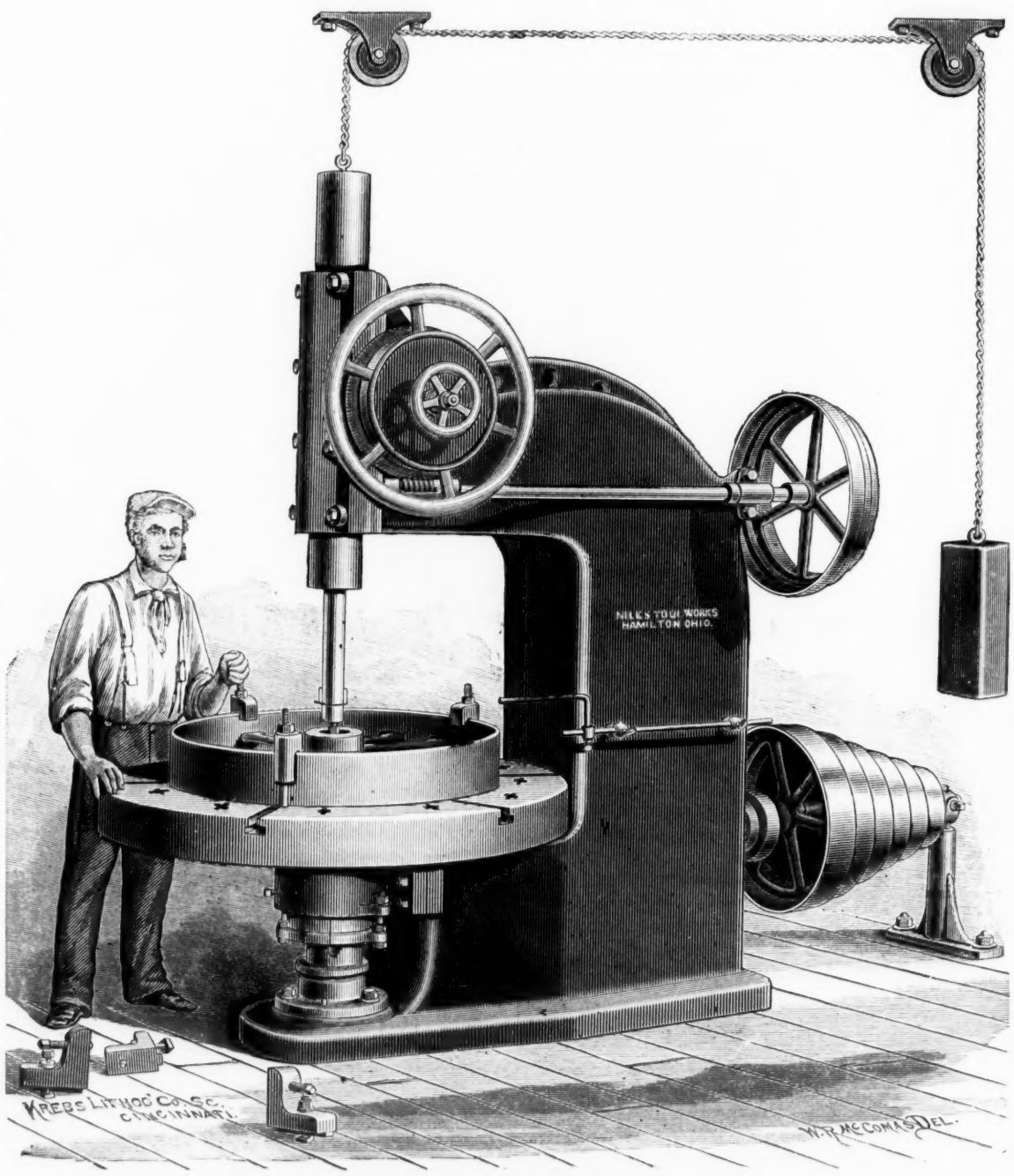
In regard to this shafting, there seems to have been some mismanagement, although I am informed by officials in charge that it was chiefly the fault of exhibitors who applied for space requiring power, but failed to use it when it was too late to redistribute the allotments.

On the whole, the engineering department of the Exposition seems to have been most excellently managed by Captain Gilman, the Chief Engineer, and his able assistants, especially in view of the fact that the enormous plant which had to be all put in place in four and a half months, against eleven months for the same work at the Centennial, and that the scene of operations was almost a quagmire, and the season the most rainy and disagreeable that has been known in New Orleans for many years.

There were in use for driving the machinery of the Exposition 66 boilers and 36 engines, of an aggregate of 5,200 horse-power (there were in all 150 engines upon the ground), together with 32,000 feet of steam pipe (one continuous section of which was 30 inches in diameter and 717 feet long, made of three-eighth boiler plate, double-riveted) 5 miles of water-pipe, and several hundred miles of electric wires, supplying 1,800 arc lights, and an unnumbered multitude of incandescent lamps. Before anything else could be done, a complete drainage system had to be established to keep the grounds above water. This pumping machinery was frequently required to work to the capacity of five million gallons per hour, and there was at times during the stormy season a rain fall of two and a quarter inches per hour to provide for, in addition to the ordinary amount of water which was everywhere present immediately beneath the surface of the soil.

The total horse-power available from the engines running was, as before stated, about 5,200, against 2,400 at the Centennial, and the 11,000 feet of shafting showed against 5,800 feet at the latter place, though it must be admitted that a much less mileage of this expensive article might have been made, at this Exposition, to answer just as well. Among other articles upon the same magnificent scale, the visitor was shown a section of exhaust pipe, all riveted together in one piece, 42 inches in diameter and 265 feet long, made of quarter inch boiler plate.

When the observer remembers the short time in which the 76 acres of buildings (against 72 at the Centennial, 31 acres being



SPECIAL BORING MACHINE.

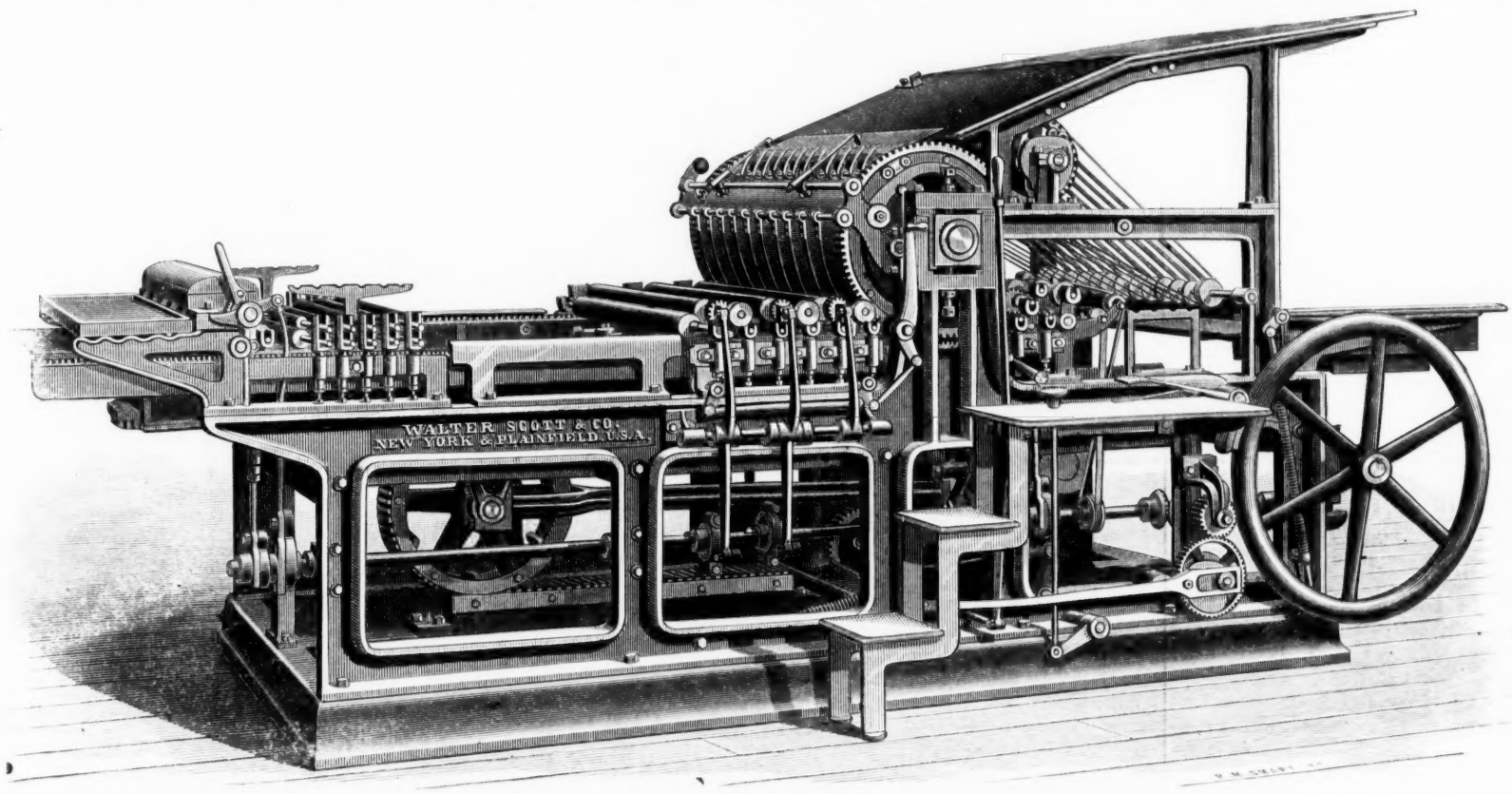
in the main building against 20 acres at the Centennial) was erected, all at a cost of about one million dollars, against six millions at Philadelphia, and sees the comparatively beautiful results attained, and considers that it was mostly done by persons inexperienced in the building up of great expositions, and far away from the busy manufacturing centers of the north, he can but be astonished at such great results with time and means so small, and must I think, deprecate the carping of the Northern newspapers about inefficiency of management, dilatoriness of action, and corruption of financiering.

Although many mistakes incident to human action have been here made, and it is easy to see now where things might have been better, quicker, and more cheaply done, yet, on the whole, results have been obtained which, considering the time and means at command, must excite the admiration of every fair-minded beholder. There is no question but what the managers and exhibitors have done their utmost to make this rank fairly with the great international shows of this country and Europe, but, after all this has been said, there remains the one great and vital criticism, that this exposition was not only like many of its predecessors, far from a financial success, but became actually bankrupt, and that the attendance of visitors was wholly unworthy of the magnitude of the exhibition. In this fact, I think, lies the explanation of where the great mistake of the whole affair was made, which was in starting the Exposition at all. There is no doubt now but what its sanguine projectors committed a huge blunder in attempting to install an undertaking of this magnitude in a city of less than a quarter of a million inhabitants, which is situated 1,000 miles away from any other large cities, and nearly 2,000 from the two greatest cities of the Continent.

Had this great show been situated within even 500 miles of New York, Philadelphia, or Boston, there is little question that it would have been a financial as well as industrial success. Bad as the case is, however, I do not think the people of the South, nor even the United States Government, which has been the heaviest loser, will, a few years hence regret that this Exposition has been held. Far outweighing the cost will be the incidental benefit to our Southwestern States, not only in stimulating trade among their own people but with the North, and with our Mexican neighbors. Furthermore, the benefits arising from the education of their country people who have here seen things that they never before dreamed of, will be of great importance, and will of itself largely overbalance any pecuniary loss that may have been suffered.

New Lithographic Press.

The cut on this page represents the Scott lithographic stop-cylinder printing press, a machine in which the stone bed is driven by a crank motion, and the printing cylinder stops during each return movement of the bed. To start and stop the cylinder, cams are used in all first-class machines, with connecting-rods and levers engaging with the cylinder. In the Scott machine, cams of large diameter are used, which connect with the cylinder direct by means of a moving frame. There is no lost motion, hence the machine runs entirely smooth, and at a much higher speed than formerly attained. It is sometimes necessary to stop the cylinder or roll the form twice, thrice, or any number of times without printing a sheet. This has always been attended with danger of breaking the machine, from two causes, viz.: By tripping it at the wrong time, and by leaving it half way tripped. In either case the machine is sure to be broken. In the Scott press this has been entirely overcome by a contrivance which prevents the operator from tripping it at the wrong time, and if it should be left half tripped the machine itself corrects the error and prints the sheet as usual. It can also be instantly set to double or treble roll automatically. The water and form rollers can be raised from the form and from each other by one lever. The machine is very strong and seems to be well constructed, giving an unyielding impression sufficient to print bond paper without wetting. Feed gauges are adjustable and give a correct register. The gears and racks are all accurately cut. Roller journals, friction rolls, and wearing parts are made of steel, great care being taken to make a durable as well as an efficient machine. They are made with either front or back delivery, laying the sheet printed side up. These machines are manufactured by Walter Scott & Co., manufacturers of printers' machinery, Plainfield, N. J.



NEW LITHOGRAPHIC PRESS.

If a reporter of the *World* is to be credited with hearing correctly, and with the usual prejudice for strict truth, L. J. Trowbridge, general passenger agent of the London & Northwestern Railway, is entitled to a position at the head. He is reported as saying, speaking of the fast train from London to Aberdeen: "In running down Shopfell, a point on the road in Scotland, this train runs nine miles in three minutes. Is there any train in the world that can equal this?" We should say no, decidedly.

LETTERS FROM PRACTICAL MEN.

Obtaining Strong Castings from Scrap Steel.

Editor American Machinist:

Will you insert the following as a supplement to my article of May 30:

Steel, as is well known, contains less carbon than cast iron and more than wrought iron, the latter sometimes containing but a trace. Carbon is held in cast iron in a combined and in an uncombined state. When combined it is chemically united with iron, as seen in hard or white cast iron, and when uncombined the carbon appears in the form of graphite, as seen in No. 1 grades of foundry soft gray iron. Cast iron containing carbon in the graphite or uncombined state requires a higher temperature to melt than when it is chemically combined with the iron, and the larger per cent. of chemically-combined carbon iron contains the less heat is required to melt it. Now the carbon in steel and wrought iron is chemically combined, similar to that in hard or white cast iron, so to grade or tell which will require the highest temperature to melt it we have as a general thing but to know the percentage of carbon. As we see that wrought iron contains the least carbon, we therefore find it requiring the highest temperature to melt, and steel containing as it does less carbon than hard or white cast iron requires a temperature next in height to wrought iron, so that if wrought iron can be melted (which, of course, has often been done) one can be doubly sure of melting steel.

The more carbon there is in wrought iron, steel and hard cast iron not only causes it to be melted easier, but also makes it retain its life or fluidity longer. Any one experienced in melting wrought iron and steel, knows that liquid wrought iron requires lively handling to prevent "cold shut" castings, etc.

Carbon can be given and taken away from iron or steel. Fuel will supply it, and air eliminate it. When wrought iron or steel is melted in a cupola, both of the above agencies are at work upon it, and while we can in one sense say they are being weakened through oxidation, we can in another sense say they are also weakened through carbonization, for when steel, etc., is mixed in among fuel, and there melted, it cannot but be affected by it, as the oxygen of the atmosphere combining with fuel in a cupola creates carbonic acid and carbon oxide, which, when liberated in concert with other gases, such as sulphur, etc., which fuel contains, all go towards the deterioration of "scrap steel" or wrought iron scrap.

I think it is safe to say that either of the above cannot be melted in a cupola, and directly from their product castings produced as strong as the material was when charged. But I do think such could be well and economically accomplished in a reducer built something after the style of an air furnace. Thus, as far as crucibles are concerned, I leave the readers to draw their own conclusion from the valuable paper written by T. Nordenfeld, and published in the AMERICAN MACHINIST, June 6, 1885.

THOMAS D. WEST.

More Particulars Wanted About a Foundry Job.

Editor American Machinist:

Having for years been a reader of your paper I get many good hints on foundry practice. But many writers like Mr. David Spence, who in paper of May 30, says he gives the information for his friends, tells what he has done, but not how. In casting the roll five inches diameter, six feet long, with a four-inch shaft running through it, did he make a dry or green sand mould? Did he pour it on end or horizontally? Did he put the shaft in hot or cold? When he says he ran about two hundred pounds of metal through to make the shaft red hot, it looks like heating up with a small amount of fuel, for his casting is only one-half inch thick instead of one inch. D. C. B

Memphis, Tenn.

Shut Off Sunday Work.

Editor American Machinist:

I wish I was where I could grasp the hand of James F. Hobart, for he is taking a step in the right direction.

As superintendent in a large establishment I can back up his suggestion of being able to keep running without those Sunday jobs.

I do not allow any Sunday jobs to be done, and our mill runs regularly. When a young man I had a situation as engineer and our boss always made his calculations for work on Sunday. I did not rebel for nearly three years Then I said, "No more Sunday work," and stepped out. Our boss tried inducements to get me back, but I could not go back. I had taken a stand and would not go back.

I found there were lots of places where good men could get good situations, and I have been going along without Sunday work, and successfully too.

By all means shut off this Sunday work.

W. L. W.

Making Thin Cast Plates.

Editor American Machinist:

In answer to question 171, you say it is very difficult to get a thin cast plate made without warping, which is very true, unless

manipulated by a skillful moulder. My plan for making such work is, to fasten the pattern to a smooth follower-board—have the board perfectly smooth on side opposite pattern. For ramming up the cope on, have board about 2″ thick, then use a good strong flask, with smooth joints. Break off the gates as soon as possible after casting, as they have a tendency to restrain even shrinkage. Keep the flask perfectly level, and let the casting remain in over night, or long enough to become cool. I prefer using stove moulder's gates, as they are less liable to disturb the piece in breaking off. If the piece is removed from the flask before cooling, place it perpendicularly on edge. I am satisfied if any one will give this method a fair trial he will not be disappointed.

W. T. MEALOR.

Montgomery Iron Works, Montgomery, Ala.

That Grindstone Question.

Editor American Machinist:

In your issue of June 6, Mr. Richards asks why he may not hear from some of the many readers of the AMERICAN MACHINIST upon the grindstone question.

Mr. Hobart says, "Discussion is what we are after," and I for one should like to hear this subject discussed a little more.

In the shop where I first worked, the grindstone was set up on a wooden frame, and two or three holes bored in the floor below for the water to run off into the cellar.

A block of wood about 4″ square was nailed on either side to the wooden frame, and the men could grind from the front or back, as they chose.

By the way, Mr. Richards, I call the front of the stone that part which revolves towards you. When a chap ground from the front side he very often got caught like the fellow Tom told about.

His tool would dig in and come up slap against the stone, grinding away at the poor chap's knuckles until something gave way or the belt was thrown off.

Although it was much slower grinding, I used to get around to the back of the stone, as I thought it was decidedly the safer place. Since then, however, I have used grindstones which were not mounted upon wooden frames, neither were there any holes bored in the floor beneath.

One of the best, and the kind I shall always advocate, had a truing device on the back side, with a cover which came up close to the stone—just like Tom's.

But instead of the three-inch square iron clamped to the frame, such as he uses, I used an iron casting, which had a top of about $\frac{3}{8}$″, and clamped this piece to the frame, so that the top would be a little above the center and very close to the face of the stone.

With this form of rest I always grind from the front of the stone, and find that I can grind quicker and more accurately, and keep my tools in better shape than by any other way.

I should not advocate clamping the rest if the truing rig is not used. F.

The Grindstone Question—Drilling Brass.

Editor American Machinist:

Mr. Richards in his recent article would seem to wish a vote taken on that grindstone question. Having a picnic on the big planer near the stone the other day I thought of getting the boys to give their style away, although it can have no more weight on the question than a train vote has on a presidential election.

Mr. Hobart, I am sorry to say, got decidedly the best of it, as ten out of sixteen struck a bee line for the back of that stone.

As to the drilling of brass, can't both gentlemen see they are right when they remember that the foundrymen pass off as many different mixtures for brass as the groceymen do for butter. If Mr. Hobart will get a good piece of yellow brittle brass and try a reasonable hole, he will find he can get through without oil or squeal, while if Mr. Richards will tackle what they call here "red brass" (a piece that shows its copper), he might think there is a bag-pipe around before he gets a quarter inch drill two inches deep.

A SOFT JOB.

End Graduations on Scales.

Editor American Machinist:

A rule like enclosed sketch, graduated on the ends, forms a very convenient means of measuring some kinds of work where it is impossible to use the ordinary scale or rule. The idea was suggested to me by a gentleman for whom I was doing a job requiring such a tool, a short time ago, and as I have never seen anything of the kind for sale I made one, and often find use for it.

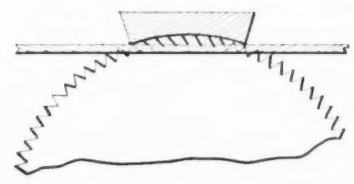
FRANK H. TRACY.

Poughkeepsie, N. Y.

Short Method of Working out Large Core Boxes.

Editor American Machinist:

Although the following method of working out staves for large core boxes, on the circular saw, may be known to some of your readers, there will no doubt be many to whom it will be new. We will take, for example, a ten-inch box, and will suppose that we have a ten-inch saw. Lower the saw, or raise the table, until the saw projects about $\frac{1}{8}$″ above the surface; clamp a straight-edge across the table at right angles to the slit and in front of the saw, at such a distance as will bring the center of the saw at the center



of the stave, as in cut; run the stave across the table, which operation will hollow out part of the surface required. Then raise the saw about $\frac{1}{8}$″ at each subsequent operation, until the stave is hollowed the entire width. In taking the last cut, the saw should not be raised more than $\frac{1}{32}$," and the stave moved very slowly, when, if the saw is in good condition, the surface will be left smooth enough to finish with sandpaper. The staves may then be glued up around two or more heads turned to diameter of core box. Should a box of any diameter less than ten inches be required, move the straight-edge diagonally across the table until the proper diameter is reached, always keeping it in front of saw. In this manner any circle, from ten inches down, may be cut.

FREDERICK LEU.

Greenpoint, L. I.

Grinding Tools and Employing Machinists.

Editor American Machinist:

I have been a constant reader of your valuable paper ever since it has been a weekly journal, and can say that I owe most of my success in the machinist trade to such contributors as F. H. Richards; and when he asks who can get the most on his side of the grindstone I feel like giving my opinion.

I agree with Mr. R. in every respect in grinding tools. Were I the owner of a shop I would box up the back side of every grinding concern in the shop. The best grinding device that I ever came across is at the works of Morgan, Williams Company, Alliance, O. It consists of an emery wheel 24″ diameter by 4″ face, as near as I could judge, boxed up all but about 8″ or 10″ of the front face. Water is supplied by a small rotary pump. In front is placed a slide rest for holding tools while they are ground, just to suit the operator. It looked like a hard place to put a slide rest, but I believe it earns as much money as any other one in the concern.

In regard to employing bunglers, we will take Mr. Hobart's Tom for example. He hears that they are paying more money somewhere westward, so he gets on the cars and goes to Troy. He drops into Mr. R.'s shop, goes to the grindstone to grind a thread tool and stays in that shop about fifteen minutes. As he goes out of the door R. says: "Where in the world did that fellow learn his trade?" So after working around for a year or so he goes back to H.'s shop a wiser and a better mechanic, for he has found out that some things that were told him as established facts are not true, for people are accomplishing results that he at one time thought impossible. He has gained knowledge in his trip that he will never see in print. Traveling around does to a young man what the tumbling barrel does to a rough casting. I know of young men who have always worked in one place. They get to thinking they know all there is in the business, and nothing will take the conceit out of them quite so quickly as to work in several different places. P. J. F.

Tinning Wrought Iron.

Editor American Machinist:

The question has been asked: How much muriatic acid and how much rain water is required to do tinning. Mix half and half for a pickle, and keep it in a stone basin, and when not in use keep covered. When tinning put some beef tallow *not rendered* on top of your melted tin. It makes the tinning cleaner. Some information in regard to melting the tin may be of profit to the trade.

If the pieces of iron are long your handle for melting requires to be long. If you only require to tin the ends of shafts your ladle requires depth and not length. The tin when melted should not be too hot nor too cold. To test your tin take a pine stick and put it in your tin. If it is too hot it will make the stick blaze, and if it is too cold the tin will stick to the piece of wood; but if it bubbles around the wood it is just right for tinning. I have instructed a boy so as he can tin about two hundred small shafts in a day.

DAVID SPENCE.

Galesburg, Ill.

A Needle Feed Oil Cup.

Editor American Machinist:

I send you a sketch of how I make needle feeders out of common oil cups. Tap the hole, fit a screw in just tight enough to hold, saw a taper cut in screw on two sides; the higher up the screw is the faster it feeds. Screw it down to shut it off.

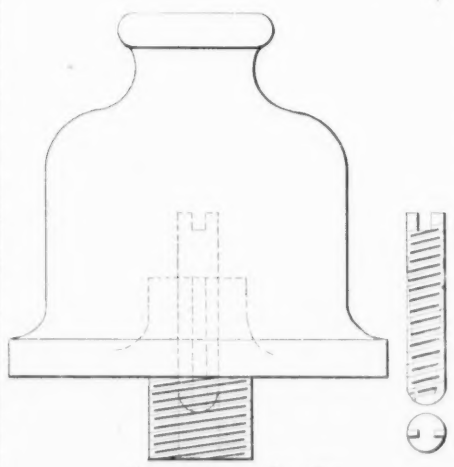
JOHN J. BINGLEY,
M. M. of H. J. H. and G. R. R.

Hanover, Pa.

Casting Rolls on Wrought Iron Shafts.

Editor American Machinist:

As casting rolls on shafts is interesting some, I will give my experience in hopes that it may be of some benefit. I cut a coarse right-hand thread on one end for six inches, and a left-hand thread of the same length on the other end. This is for a shaft that is to have a roll twenty-four inches long on it. I clean the shaft of all rust and grease and cast with a core. I have done this on feed rolls for wood planers, and rolls for sorghum mills, and I never heard of one getting loose.



NEEDLE FEED OIL CUP.

GEO. KEMBLE.

The Dalles, Oregon.

Casting Rolls on Wrought Iron Shafts.

Editor American Machinist:

A great many of your readers have taken an interest in the casting of rolls on wrought shafts. One advocates smearing the parts with red lead, another tinning them, and one says that the moulders don't know why they put on the red lead, only that it is the custom, etc.

Every blacksmith knows that lead is a bad thing to have in his fire if he wants to make a good weld, and brass chips are equally as bad in the bed of a puddling furnace; in both cases it is better without.

In casting rolls on wrought shafts, and getting them free from vibration, the less foreign matter you have between the points of contact the more solid the job will be. Whatever is added to the thickness of the shaft, by putting on lead, is that much lost in the shrinkage of the cast-iron. Any one that has cast a solid babbitt box on a cold shaft knows what trouble he has had in getting the shaft out—sometimes he cannot do it. But let him smear the shaft with white or red lead and he will see with what ease it will come out, because he enlarges the shaft by means of the lead, in amount equal to the shrinkage of the babbitt. The old plan of casting planer cylinders on wrought or steel shafts, getting them free from vibration was a difficult thing to do. Now here is where my plan of heating the shaft before putting it in the mould would be good, as both metals are expanded by the heat, and they shrink alike when cooling. In casting a roll on a cold shaft will the shrinkage of the cast iron not have a tendency to tear itself away from the fastenings on the shaft? Cutting screws is not always convenient. By heating the shaft the moisture and rust that may be on it are all removed, consequently the casting will be more solid.

BENJ. F. HETHERINGTON.

Diagrams From Locomotives with the Allen Valve and with Plain Valve Compared.

BY FRANK C. SMITH.

I do not remember of ever seeing a set of cards taken from the locomotive to demonstrate the comparative merits of the Allen and the plain valve. It is generally believed that the Allen valve makes a "smarter" engine.

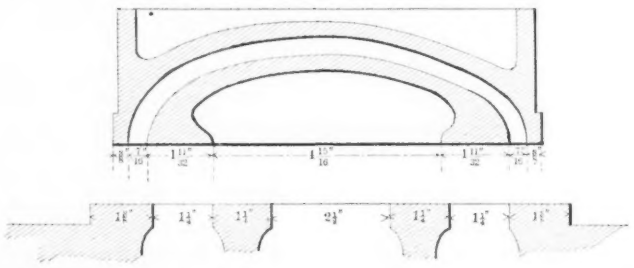
The cards Nos. 1, 3, 5, 7, and 9, were taken from an 18″×24″ mogul of the Cincinnati, New Orleans and Texas Pacific Railroad, with Crosby indicator. The following are dimensions: Travel of valve, $5\frac{1}{2}$″, steam parts 16″×$1\frac{1}{4}$″, exhaust port 16″×$2\frac{1}{2}$″, outside lap of valve $\frac{3}{4}$″, inside lap of valve $\frac{1}{32}$″, lead at full stroke $\frac{1}{32}$″, plain valve.

Cards Nos. 2, 4, 6, 8, 10, and 12, were taken from an 18″×24″ passenger engine, of following dimensions: Travel of valve, $5\frac{1}{2}$″, steam ports, 16″×$1\frac{1}{4}$″, exhaust port, 16″×$2\frac{1}{2}$″, outside lap, $\frac{7}{8}$″, line and line inside, lead at full stroke, $\frac{1}{64}$″, Allen valve, Crosby indicator. All of the cards were taken by Mr. James G. Tomlinson, the Assistant Superintendent of motive power, and can therefore be relied on for correctness.

The exhaust nozzles of the mogul were double, $3\frac{1}{4}$″ in diameter, and $3\frac{1}{2}$″ on the passenger engine; also double. Both engines had been in service about a year, and no preparations whatever were made "for the occasion." The engines were on regular trains. The passenger engine had a load of 240 tons exclusive of her own weight, which was 90,000 lbs. The mogul's train weighed 700 tons.

Card No. 11 is from the passenger engine, but with a plain valve of the same dimensions as the Allen valve. An 80 spring was used in place of the 60 used for the balance of the cards. The characteristic feature of all of the cards is the small amount of back pressure, which is due to large exhaust nozzles, which are larger than those on 5 out of 6 engines of same size and service in this country. In this respect they are about perfect. Card No. 1 shows this perfect exhaust, and also that the left hand card has a longer point of cut-off than the right hand card.

The value of the Allen principle is at once shown in comparing cards 1 and 2, as card 1 at only 186 revolutions per minute, with wide-open throttle, shows an initial pressure of 20 pounds less than the boiler pressure, while card No. 2, at 298 revolutions per minute, and throttle half open, is but 12 pounds below the boiler pressure. It will be noticed also, that the admission line of card 2 holds up noticeably better than card 1, while the combined area of card 2 is greater than of card 1.



The value of the Allen principle is clearly shown in these cards, as No. 2 with the Allen valve, at 112 more revolutions per minute, reaches 8 pounds nearer the boiler pressure than cards 1. Cards 3 and 4 are equally strong in their testimony for the Allen valve, as card 4 at 54 revolutions more per minute, with less throttle is 7 pounds nearer the boiler pressure. The admission line is equally good in each, and is remarkable for its boldness in holding to the point of cut-off. Both of these cards are marked at 8″ cut-off, but it is plain that while this is correct in card 3, it is wrong in card 4, which is probably 6″.

At higher speeds and longer points of cut-off the lead appears to be slightly too small, as the piston appears to run away a trifle before the maximum pressure is reached, but in cards 3 and 4, nothing can be desired in this respect.

The fault noticeable in the right-hand card of No. 1 is also shown in No. 3, that is a longer point of cut off, and this fault is apparent in all of the cards from the mogul. This is, of course, due to the point of suspension of the link, with other affecting details being, in error. The right-hand card of No. 4 shows a higher initial pressure than the left, which is due to the forward cylinder casing being removed to prevent drilling a hole through it for the piping. The loss of initial pressure in the left card shows the value of properly protecting the cylinder. Card 8 also shows this more clearly. Cards 5 and 6 also show the effect of the Allen principle, as, in fact, do all others in which it is used. Card 6, at 24 more revolutions per minute, has an initial pressure 5 lbs. nearer the boiler pressure than card 5. Card 5 shows the effect of the removal of the cylinder casing, in the lower initial pressure of the right hand card. Card 6 is marked at 14″ cut off, but the card indicates a shorter point. The left hand card of No. 6 shows a higher point reached by the compression, which is due to a difference in the clearance space, an inequality in the lead, and the necessity of more of it. Card 5 is much better in this respect. Card 8 shows the effect of the Allen principle in the well-sustained steam line, which drops in card 7. Card 7 shows a better corner at the commencement of the admission line than No. 8, and also a lower pressure in the cylinder at the end of the stroke. If the eccentric were advanced to increase the lead of card 8 the upper corners would be improved as well as opening the exhaust sooner, which would tend to lower the back pressure at the end of the stroke.

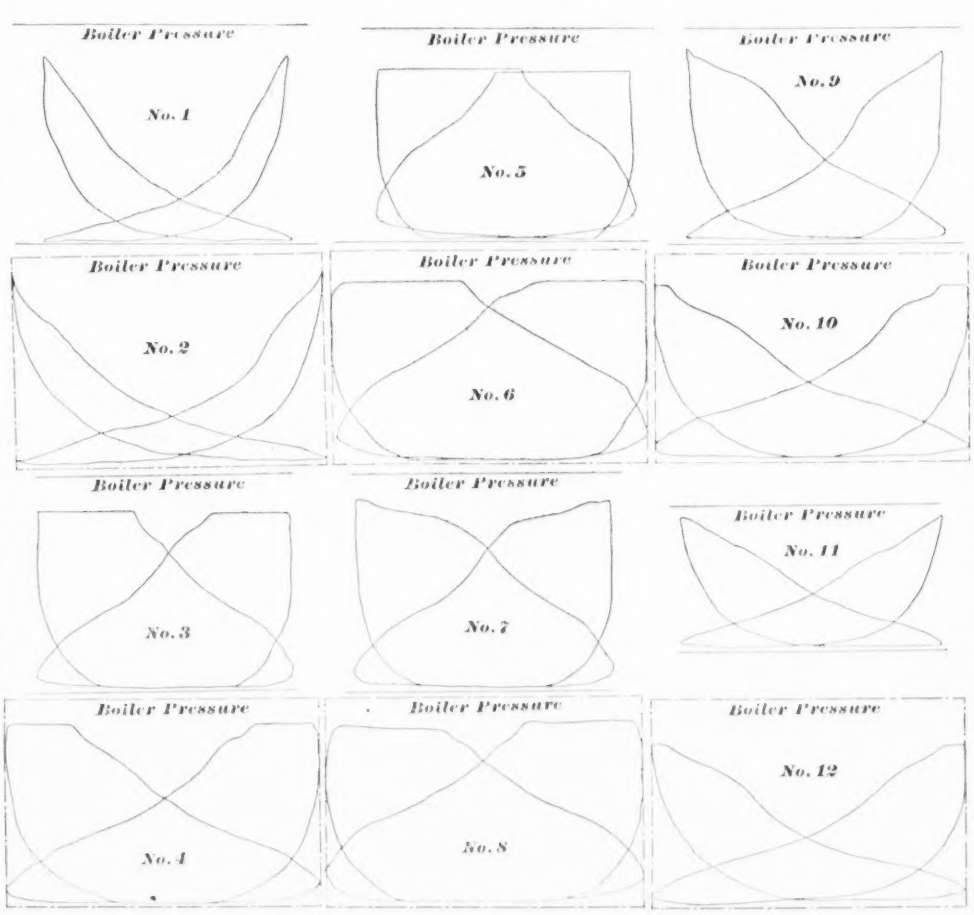
The effects of the Allen principle is very noticeable in cards 9 and 10. The points of cut-off are the same in both; but it will be noticed that card 10, at 78 revolutions more per minute, carries a straight admission line for quite a distance, while card 9 drops at once from the start. The square corner in the drop of the admission line of No. 10 might indicate the sticking of the pencil, but at this point I am assured that nothing of the kind occurred, and that the pencil traveled from six to ten times over each card. It would appear in card 10, even with the Allen principle, that the piston runs away from the pressure; but why this should occur so abruptly is not clear, although the movement of the piston is, of course, greatly accelerated as it recedes from the commencement of the stroke. Both Nos. 9 and 10 are remarkable for the perfection of the exhaust.

Card 11 (taken with 80 spring) reaches within 15 lbs. of the boiler pressure with wide open throttle, while No. 12 is 30 lbs. below, but it will be noticed with but ⅓ open throttle, and it is clear that the chest pressure of 12 is reduced by this amount of throttling, and to this alone is due this difference, as the Allen principle at once shows its virtues by the straight admission line in card 12, while No. 11 drops from the start. The revolutions per minute are also much in favor of card 11.

These cards all attest to the value of the Allen valve, while perfect smoke arch arrangement of all of the engines of this road allow of remarkably large exhaust nozzles. I doubt if one road in ten can show such perfection of cylinder action, as these cards attest to.

I add a sketch of the Allen valve, in use on the passenger engine from which these cards were taken.

The following data refer to the cards:



No. 1, rev. per min. 186, cut-off 4½″, throttle wide open, boiler pressure 148 lbs., spring 60, plain valve.

No. 2, rev. per min. 298, cut-off 4″, throttle one-half open, boiler pressure 140 lbs., spring 60, Allen valve.

No. 3, rev. per min. 90, cut-off 8″, throttle two-thirds open, boiler pressure 145 lbs., spring 60, plain valve.

No. 4, rev. per min. 144, cut-off 8″, throttle one-half open, boiler pressure 140 lbs., spring 60, Allen valve.

No. 5, rev. per min. 96, cut-off 14½″, throttle two-thirds open, boiler pressure 140 lbs., spring 60, plain valve.

No. 6, rev. per min. 120, cut-off 14″, throttle two-thirds open, boiler pressure 142 lbs., spring 60, Allen valve.

No. 7, rev. per min. 102, cut-off 11½″ throttle wide open, boiler pressure 145 lbs., spring 60, plain valve.

No. 8, rev. per min. 126, cut-off 10″, throttle one-half open, boiler pressure 140 lbs., spring 60, Allen valve.

No. 9, rev. per min. 144, cut-off 8″, throttle two-thirds open, boiler pressure 145 lbs., spring 60, plain valve.

No. 10, rev. per min. 222, cut-off 8″, throttle one-third open, boiler pressure 145 lbs. spring 60, Allen valve.

No. 11, rev. per min. 240, cut-off 7½″, throttle wide open, boiler pressure 140, spring 80, plain valve.

No. 12, rev. per min. 264, cut-off 8″, throttle one-third open, boiler pressure 145 lbs. spring 60, Allen valve.

[The diagrams are reduced to half scale, so the scales to be used in measuring pressures will be 120 and 160, instead of 60 and 80.]

Butt's Right Angle Level.

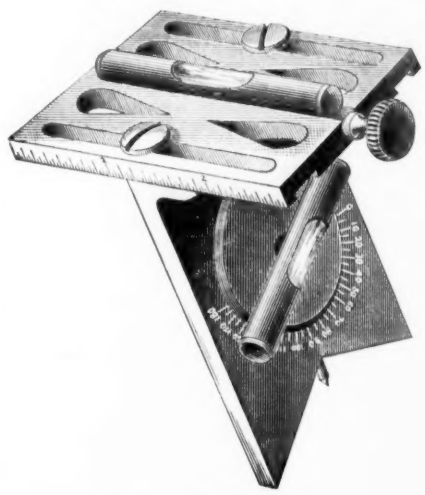
This little tool is designed for a variety of purposes in laying out and leveling work. It consists essentially of two plates, each provided with a spirit level, one of which is stationary and the other adjustable to angles on a graduated dial. The plate carrying the stationary level is adjustable on the other one by means of a screw, its position being read from the graduated edge.

A few only of the uses of this tool, in addition to the purposes of an ordinary level, can be referred to here. Suppose it is desired to establish a center line on a parallel shaft: The top plate is adjusted to half the diameter of the shaft, the other plate brought against the shaft, adjusted by the spirit level, and a line scribed against the straight edge of the plate; this line is then tested by moving the tool to the other side of the shaft; then, by repeating the operation at the other end of the shaft and connecting the short lines by the use of a straight edge, a center line of any length may be established. Now, by turning the tool to the quarters of the shaft, and to the bottom, lines dividing the shaft into quarters, may be readily aud accurately found.

If the shaft is tapering, using the tool as described will give points, where the lines cross each other, for one or more center lines.

For a shaft that is larger than provided for by the graduations, the **V** surface at the bottom is placed against the shaft and adjusted by the level; then, where the pointer shown, which is held by a spring behind it, bears against the shaft, is a point in the center line.

By bringing the flat surface of the lower plate against a round or square bar, and scribing along the edge of the upper plate, reversing around the piece, the center will be indicated. Numerous other uses for the tool, such as setting for angles, etc., etc., will suggest themselves.



RIGHT ANGLE LEVEL.

B. B. Butt, 459 Broad Street, Newark, N. J., is the manufacturer.

Melting Cast Steel.

Since the communication on this subject, from Thomas D. West, which appears in another page, was in type we have received the following from him, which should be read in connection with that communication:

While it is a fact that the strength of "scrap steel" is impaired by being melted in a cupola, it is evident that the degree to which its original strength is impaired will be greatly affected by the amount of carbon the steel (or cast iron) contains. A soft or low carbon steel should produce a much stronger product than a hard or high carbon steel, and I have no doubt but that from a careful mixture of low carbon steel, with low carbon cast iron, proportionately strong castings could be produced.

The result obtained from a mixture of high carbon steel and cast iron cannot be other than such as to impair the original strength of the cast iron. (Steel when melted *alone*, would, of course, be governed as regards strength the same as where it is mixed with cast iron.)

While it is true, there are many who may have known steel to add strength to cast iron, there are others who have had reverse experience.

Taking the question in its application to cupolas, the result may to some extent be controlled, but it is certainly far from being favorable to the direct production of strong castings. Whether an air furnace could be made to successfully accomplish the end, is a matter for future experiment; as regards the utilizing of crucibles, the main objection is their expense. To produce strong castings *economically*, from scrap steel, without requiring castings to be decarbonized in an annealing furnace, is a problem which will no doubt in time be worked out.

The Chinese are apt scholars. On a steamer built and owned by Chinamen, plying between Shanghai and Woosung, an experienced Chinese pilot was replaced by another who would work for a little less wages. In meeting another steamer the inexperienced pilot became confused, ran his vessel across the bows of the other, the result being that she was cut completely in two. More than eighty passengers lost their lives.

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NEW YORK, JUNE 20, 1885.

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Standard Holes in Machine Tool Spindles.

Of late there is considerable discussion amongst mechanics and engineers on the subject of a standard taper for holes in lathe and drill spindles, and other machine tools. This is undoubtedly a matter of considerable importance to the users of such tools, and if it were brought about by manufacturers would be appreciated by buyers. Special tools, small chucks, etc., are often fitted to a lathe by means of the hole in the spindle, and it would be a matter of a good deal of convenience, and sometimes no inconsiderable saving, if they could be used in other lathes of the same size, but from different builders, and in drill presses. At present this cannot generally be done. There are other reasons well known to machinists why a standard taper would be desirable.

With a view to ascertaining the practice in respect to these tapers we addressed an inquiry to a number of representative machine tool builders, asking what taper per inch or foot, they used. Elsewhere we publish over 50 replies to this inquiry, for which we acknowledge the obligations we are under to the writers. A perusal of these letters will be both interesting and instructive, showing as it will the wide diversity of practice, the reason for which is not very apparent. The question will naturally occur to most readers: Which of the tapers, varying for lathes from $\frac{11}{32}$" to 1½" per foot, is right? The conclusion is almost inevitable, when this difference is found amongst the best builders, that the exact taper is not a matter of very great importance; that if more taper is better for some purposes, less is better, in the same tool, for other purposes, and that the advantages and disadvantages of comparatively slow or quick taper would for general use about balance each other. If this is admitted, then the establishment of a uniform standard taper would be easier than otherwise.

There seems to be an opinion in two instances that the taper for small lathes should be different than for large ones, but a compromise in this respect would seem to be practicable.

It will be noticed that the Morse taper is more commonly used than any other, which is generally taken to be $\frac{5}{8}$" to the foot. In fact there are six distinct Morse tapers, one being $\frac{5}{8}$" per foot, and the others varying slightly from this, as illustrated in the AMERICAN MACHINIST of Nov. 29, 1884. This taper ($\frac{5}{8}$" to the foot) has been recommended by writers upon the subject, and if a change were made in the interest of a uniform standard, could, perhaps, be adopted as easily, or with as little total change, as any other.

There are no serious obstacles in the way of adopting a standard taper. If machine tool builders were satisfied of the desirability of doing so, and were to meet for the purpose after the manner of the Master Carbuilders, they would very quickly agree as to what that standard should be. It would not be a question of changing tools in use in their own shops; only keeping to the standard in tools sold and sent out from their works. The expense of the required changes would not be serious; a mere trifle compared with the benefits resulting from uniformity. If there is anything like a universal demand amongst purchasers of machine tools for a standard taper, there would probably be but little difficulty in having it satisfied. As will be noticed the writers of some of the letters put themselves on record as favoring it. The important question is: Do machine shop owners generally desire it?

The Nail of the Future.

Iron cut nails are fast going out of fashion. Steel cut nails are driving them out. Wire nails are coming into use with great rapidity and the designing of machinery for making them is taxing the inventive ability of many good mechanics. It is the opinion of some who have carefully studied the mechanical and metallurgical progress that steel wire nails are destined to come into common use in the near future. Old Bessemer rails will come upon the market in large quantities before many months have passed because they are wearing out faster than was thought possible in the earlier days of steel tracks. Mr. Masters has shown that they can be melted in an ordinary cupola and moulded into good castings, but it is believed that they can be utilized with more profit by drawing them into wire. Old steel rails can be readily worked into wire of good quality, suitable for nails. A mill has been erected in Syracuse for making wire from old rails, but it has not yet gone into operation. How fast steel wire nails will come into use depends largely upon how fast old steel rails are thrown upon the market.

More Exhibition Medals.

A new crop of medals was harvested at the New Orleans International Exposition, and since the close of that big show notes about the distribution of these medals are frequently heard. These notes or remarks are always circulated by letter or in type. We do not remember hearing any one having a knowledge of machinery matters ever mention, in referring to the qualities of a mechanical production, the fact of a medal being taken by it at an industrial exhibition—except it were the exhibitor himself. Those who know nothing about machinery may be allured by medals, diplomas, "honorable mention," and other favors of the kind dispensed by admiration committees at some exhibition, but even they would hesitate about purchasing any machine of considerable value upon the strength of such claims before consulting somebody whose judgment is not likely to be swerved by the intervention of an exhibition award.

The question is often asked, What good do these medals do? Many of them are neatly stamped, and may pass for works of art. They look well upon the parlor table. When callers stay until the weather and other every-day topics of conversation are exhausted, it is very convenient to refer to the medals to while away the time. Then they specially amuse the children. One recipient of medals for machinery exhibits is said to carry them around with him in his pockets. It is even remarked that he has one or two special pockets set in his pantaloons to hold some of the choicest of them. "Why," said a machinery manufacturer, "if you were to turn him upside down and shake him, a perfect shower of medals would fall."

Poorly Attended Meeting of Mechanical Engineers.

The recent meeting of the American Society of Mechanical Engineers at Atlantic City, was a particularly interesting one to those who attended. The discussions were well sustained, and the presence of several ladies increased the interest. Of a total membership of 610, only sixty or seventy members attended the meeting. Perhaps the members are unusually busy, but the general impression is that mechanical matters are not very lively just now.

All the papers presented were in type before the meeting, and a circular was sent out to every member giving a list of them and their authors, with the offer to mail copies to any member who wished to discuss them.

A reference to the catalogue of members will show that the greater portion of them live within a few hours' journey of Atlantic City, although a better location might have been selected for the meeting.

The conclusion is irresistible that what was announced as about to be presented at that meeting did not prove a loadstone to draw the large attendance hoped for. It cannot be denied that some of the papers were of unusual value, but previous experience had shown that some of the best papers are passed over without being read or discussed for lack of time, while some of the least valuable were allowed to absorb a great deal of time, presumably out of courtesy to the individuals presenting them. We mention these matters because of the interest we feel in the society and its work. It is rapidly increasing in membership, yet the attendance at one of two regular meetings held per year falls off one half. Murmurs, not loud, but earnest, have been heard among those who prize its meetings, giving expression to the belief that too many of the papers put into type as part of its proceedings, and often illustrated by engravings prepared at society expense, are of more value as advertisements of something their authors want to bring into public notice as in some measure being endorsed by the Association, than as contributions to the progressive literature of mechanical engineering.

As the society grows older, more numerous and more influential, such advertising may become more valuable to those admitted to its benefits, and the tendency to yield this privilege to those who have axes to grind cannot be counteracted too soon.

Some other engineering societies have profited by like experience, and by applying heroic treatment have raised their standards and improved their usefulness. The remedy is to be sought in but one direction.

Several of the railroad car shops in the West have large orders on hand, but the Eastern car-makers say there is no profit in them. Some manufacturers, who rent tenements to their workmen, say they lose less money to take orders at less than cost, so as not to lose the rent of their dwelling-houses. The "company store" is another feature that gives some manufacturers an advantage over those who pay wages in cash. A few years of depressed business would, no doubt, convince manufacturers in any line who pay cash wages, and have to compete against those who pay in store orders, that the truck pay system ought to be abolished by law in every State of the Union. If they take hold of the problem in earnest, they can secure the enactment of such laws *and their enforcement.*

A butting collision recently happened on the Philadelphia and Reading Railroad between a freight train and a locomotive out on trial, resulting in the death of Engineer Street, who was running the wild engine. The accident was due to the neglect of a telegraph operator, who gave orders which led the engine and freight train to meet between stations. At an inquest, held by the coroner to ascertain the cause of the accident, lawyers representing the Philadelphia and Reading made a strong effort to saddle the dead engineer with the blame of the accident, merely because he did not sign the order he was running on, the operator having signed Engineer Street's name in accordance with a custom common on the road. The action of the Philadelphia and Reading Railroad Company in this matter is about the most contemptible of anything we have heard of for some time.

Fine French silks have been "imported" from Paterson, N. J., for a number of years. Latterly Vienna bent wood furniture has been imported from Charleston, S. C., and the business has been so brisk that another factory to make 200 bent wood chairs a day is to be erected at once in Columbia, S. C. There are many people who will not buy dress goods or fine furniture of American manufacture if they know it; hence the deception. When they discover that silks and bent wood furniture can be made of as good quality in the United States as anywhere in the world, it surprises them. Half of the articles imported into this country could be made just as well at home. Those who are laboring with such zeal to abolish our protective tariff have studied foreign goods so attentively that they have not had time to look about them and examine what is made by their own neighbors.

A correspondent would like to know the fastest speed made for a mile or more by a steam yacht not more than 20 feet in length.

Pushing the Bottom Farther Down.

The failure of the iron workers and the iron manufacturers of Pittsburgh and the West to come to any agreement about a scale of prices for working iron from June 1st. for a year, has precipitated an extensive lock out, and most of the mills are idle. The workmen were willing to accept about ten per cent. reduction, but the manufacturers demanded a still lower scale. A few of the mill owners signed the scale presented by the workmen, and continued operations. At this writing no settlement of the dispute has been reached. Of course, buyers of large quantities are waiting before placing their orders to see which party to the contest gains their point. If the workmen are defeated it means still lower prices for iron and, as a consequence, more or less reduction of prices of articles of which iron forms the chief element of cost. If the workmen's scale is finally accepted it means a stiffening of the prices of iron and iron goods. A month ago O. W. Potter, President of the North Chicago Rolling Mill Company, wrote a letter to the *Labor Tribune* expressing the belief that a reduction of wages would not meet the kind of competition prevalent and that it would not help the manufacturers.

He said: "I know the capital invested in the manufacture of iron and steel is earning nothing for its owners. Labor employed by that capital is dissatisfied, and the consumer of the products of iron and steel mills would willingly pay more for the goods if it were only asked, but not otherwise. Bankruptcy does not stop production, as receivers take hold then and are the worst competitors in the business."

It seems anomalous that manufacturers who are anxiously sighing for the bottom to be reached, are trying to push the bottom still lower, and make it harder to reach. Until the bottom *is* reached neither workmen nor manufacturers can hope for an improved and prosperous business.

The bill prohibiting the granting of free railroad passes, and making it a penal offence to receive as well as to grant a pass, was defeated recently in the Pennsylvania Legislature upon its second reading. These astute law makers seemed to consider the bill an attack upon their personal rights as deadhead travelers. With few exceptions members of Congress and members of State legislatures travel free when they go by rail. Hardly a session passes without some railroad bill coming up for action. Could the members be so discourteous as to oppose the interests of those from whom they accept valuable favors? Of course not. Honor and duty oblige them ——, but stop; What is their duty to their constituents who own no railroad securities? This is sometimes an unpleasant question, especially if strongly asked a short time before election.

While general business remains dull the erection of buildings seems to go forward with much activity. In Brooklyn building permits amounting in estimated value to more than the whole of those issued in 1884 have already been granted this year. An increase of building in almost all the large cities is noticeable, while country districts seem to hold their own as compared with former years.

Questions and Answers.

Under this head we propose to answer questions sent us, pertaining to our specialty, correctly, and according to common sense methods.

Every question, to insure any attention, must invariably be accompanied by the writer's name and address. If so requested, neither name, correct initials, nor location will be published.

(188) W. H. M., Clearfield, Pa., asks: Can you tell me of some cheap and easy way to tin a heavy cast iron box so that the babbitt, when poured, will unite with the tin? *A*—Cast iron is not easily tinned for the purpose named. We have never seen it satisfactorily done.

(189) F. W. H., Philadelphia, Pa., writes: I have a pipe, one end of which is connected with steam dome of the boiler, and the other to the water space. The steam pressure is 80 pounds. At what temperature will the steam in the pipe be converted into water? *A.*—At the least fall of temperature below that due to steam of 80 pounds' pressure, some of the steam will be condensed, and its place supplied by steam from the boiler.

(190) J. V. Y., Boston, Mass., asks: 1. I have an engine 2½″x3″. What size boat will it drive, and how fast? *A.*—Boat 22 feet long, 5 feet 3″ beam, about six miles an hour. 2. How much of the shoulder should be cut away to make a slip eccentric for reversing? *A.*—The only way to determine this is to make a drawing of the eccentric in the two positions required, and measure from that.

(191) J. S. L., Allentown, Pa., asks: Is there anything that can be used on gear wheels to stop the buzzing noise? One of the gears I refer to has iron teeth, and the other wooden teeth. The one with iron teeth runs 300 revolutions per minute. *A.*—We do not know of anything other than hard grease. We are inclined to think the trouble to be in the trembling of the gear, perhaps from too light arms. It is sometimes possible to deaden the noise of gears by filling between the arms with wood. It all depends upon what causes the noise.

(192) H. K. R., St. Louis, Mo., writes: What are the properties and best method of working Mushet steel? I had my first experience with it not long since, and could do nothing with it. I heated it the same as other steel, and when I struck it a blow with the hand hammer there was a shower of sparks all over the shop. *A.*—Mushet steel is a kind of crucible steel that requires no hardening for tools. In working, it should be heated to a very low heat—barely red—and hammered only at that heat. When forged, lay the tool down to cool. Your trouble was in heating too hot.

(193) G. E., —— writes that he has trouble with the scaling of steel pins which he casts in cast iron crossheads, and asks for a remedy. The pins are hollow, and considerable metal is allowed to flow through them. *A*—L. C. Jewett informs us that he had some experience a few years ago in this direction. His impression is that they finished the pins after casting. He thinks if the steel tube is of sufficient thickness, say ⅜″ metal, with coarse thread cut on inside, the ends fitting tight in prints, then not too much metal allowed to flow through the pin, it will not blister; it requires but a small amount of metal flowed through if the pin is heated a dark cherry color when placed in the mould.

(194) R. S., St. Paul, Mo., asks: 1. In calculating the safe working pressure of a boiler, after finding the ultimate strength, what is used as a factor of safety? *A.*—The factor of safety under Government inspection is 6 for single and 5 for double-riveted joints. For ordinary use, 7 and 8 are common. This does not take into account the weakening of the shell in riveting. According to Fairbairn, the strength of single-riveted joints is 56 per cent., and that of double-riveted joints 70 per cent. of the solid plate. 2. What is the proportionate area of safety valve? *A.*—There is great difference in practice in this respect. One square inch in area of valve for each 1¾ to 2 square feet of grate surface is about average practice. 3. What is considered the best connection of valve stem to slide valve? *A.*—Where it is practicable there is nothing better than a yoke solid with the stem, as used in locomotive practice.

Business Specials

Transient Advertisements 50 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday for the ensuing week's issue.

Curtis Pressure Regulator and St'm Trap, June 6, p 13

Edw. Sears, wood engraver, 48 Beekman, St., N.Y

Katzenstein metallic packing, 169 Christopher st, NY.

Presses & Dies, Ferracute Mach. Co., Bridgeton, N. J.

Steel Name Stamps, &c. J. B. Roney, Lynn, Mass

The Best Upright Hammers run by belt are made by W. P. Duncan & Co., Bellefonte, Pa.

"How to Keep Boilers Clean." A book mailed free, by James E. Hotchkiss, 86 John street, N. Y.

Tools for amateur and foot-power lathes. Send for illustrations. Hartford Tool Co., Hartford, Ct.

Light fine interchangeable mach'y to order. Foot lathe catalogue for stamp. E. O. Chase, Newark, N.J.

Lyman's Gear Chart. How to lay out gear teeth. Price 50 cents. E. Lyman, C. E., New Haven, Conn

Foot Power Machinery, for workshop use, sent on trial if desired. W.F. & John Barnes, Rockford, Ill.

The latest Improved Tack and Match Machinery is made by White Machine Co., Waterbury, Conn.

Pattern and Brand Letters. Vanderburgh, Wells & Co., corner Fulton and Dutch streets, New York.

R. Dudgeon, 24 Columbia st., New York, Improved Hydraulic Jacks and Roller Tube Expanders.

Split pulleys cheaper than plain ones. Trial orders solicited. York & Benton, Cleveland, Ohio.

Consulting Engineer and Mechanical expert, C. C. Hill, 84 Market street, Chicago, Ill.

Engine Lathes, Hand Lathes, and other fine tools. Assortment large: prices low. Frasse & Co., 62 Chatham St., N. Y.

The outline ("wax process") engravings shown in the AM. MACHINIST each week are made by Struthers, Servoss & Co., 32 Frankfort Street, N. Y.

Farley's Reference Directory of the Machinists, Iron, Steel, and Metal-Working trades of the United States. A. C. Farley & Co., Philadelphia, Pa.

"Complete Practical Machinist," $2.50; "Mechanical Drawing Self-Taught," $4. Books for workmen Joshua Rose, Box 3306, New York City.

Heavy second-hand 18 x 36 engine for sale. Send to Frick Co., Waynesboro, Pa., for prices and a list of second-hand engines and boilers, all kinds, and in good order—prices low.

Morrison's Practical Engineer, a complete treatise on steam and general machinery. Price, $1; mailed free. Indicators, Engineers' Instruments and outfits. W. A. Morrison, Box 373, Lowell, Mass

Locomotive Engine Running and Management. By Angus Sinclair. Price $2. An excellent book for men interested in steam engineering, valve setting, designing valve motion, the care of the Westinghouse brake, etc. Published by John Wiley & Sons, 15 Astor Place, N. Y.

Useful Information for Steam Users—A 100-page pamphlet, on the care and management of the steam engine and boiler, with hints and rules for engineers and firemen. Every engineer should have this book. Send 25c. in P. O. stamps to the J. N. Mills Publishing Company, 165 Broadway, N. Y.

Every young man who aspires to be either a mechanic, merchant, or manufacturer, owes it to himself that he become thoroughly familiar with the writings of Chordal. John Wiley & Sons, 15 Astor Place, N. Y., have issued a new and enlarged 12 mo. edition of "Extracts from Chordal's Letters." Handsomely bound in cloth, with over 50 illustrations. Price, $2. Discount of 25 per cent. on orders for five or more copies.

Manufactures.

M. J. Duty & Co., Monroe, La., will build a machine shop 38x70 feet.

J. H. Smith, Nathaniel Miles, and others, are starting a pipe mill at Scottdale, Pa.

The Ohio Car & Manufacturing Company, Lima, O., intend to build a $200,000 foundry.

Fort Worth, Tex., is to have a plow factory and a cotton factory, too, says the *Gazette*.

Gerard B. Allen & Co., St. Louis, Mo., will build a two-story addition to their machine shop.

The York Iron Company will shortly open a charcoal blast furnace at Black River Falls, Wis.

J. A & J. N. Rushing, Terrell, Tex., whose cottonseed oil mill was burned some time ago, propose to rebuild.

Thos. C. Leedom & Co., 2,419 Howard Street, Philadelphia, will erect a large carpet factory at Bristol, Pa.

A. Aller, 109 Liberty Street, New York, has been appointed agent for the specialties of E. G. Felthousen, of Buffalo.

The Diamond State Iron Company, of Wilmington, Del., will erect a rolling mill on Herald Street, South Wilmington.

Roanoke, Va., has raised nearly $15,000 to aid in securing the removal of a tool factory from the West to that place.

Thomas Dolan & Co., Philadelphia, on the first day of June increased the wages of their employes in their mills ten per cent.

The Scranton *Republican* assures its readers that the $100,000 necessary for starting an axle works in that place will be subscribed.

G. W. Gibson, of Louisville, Ky., contemplates the removal of the Southern Wire and Iron Works, of that city, to Lexington, Ky.

M. J. Bond, of Grand Rapids, Mich., has purchased 2,000 acres of land in Mississippi, on which he proposes to build a saw-mill, near Armstead.

The Underwood Belting Company, of Tolland, Conn, is manufacturing cotton belting with leather cover, in addition to their usual leather product.

The Cedar Point Iron Works, of Port Henry, N. Y., are to change their plant so as to convert iron direct from the blast furnace into steel ingots.

The Little Giant Manufacturing Company is organized at Chicago to make and sell the Little Giant clamp and combination tool. Capital Stock, $25,000.

The iron works of the Coatesville Iron Company, Coatesville, Pa., have put their mill on double turn. They have orders sufficient for six months' run.

The Campbell Cotton Press Company, Albany, Ga., have been granted exemption from taxation on the compress and machinery to be erected in that city.

The Hooven, Owens & Rentschler Machine Company, who build the Hamilton-Corliss engine at Hamilton, O., are full of orders, and are running day and night.

The S. C. Bent Wood Furniture Company, Columbia, S. C., will put up a 35x240-foot factory to make 200 chairs a day. R. G. Chisolm, of Charleston, S. C., is president.

In the distribution of medals at the New Orleans Exposition, Beandry & Cunningham, of Boston, received one of the first-class for their upright power hammer.

Jas. A. O'Neil, Henderson, N. C., is preparing to erect a new carriage and wagon factory, 50x60 feet, three stories, iron front, adjoining his present factory.—*Baltimore Manufacturers' Record.*

Coffin & Leighton have started a shop at Syracuse, N. Y., for the manufacture of fine graduated scales for machinists' use. John Coffin, of this firm, was the designer of Coffin's averaging instrument.

The *National Standard*, Salem, N. J., says the Woodstown Shoe Manufacturing Company has been organized in that county. Wm. F. Lippincott, Geo. M. Andrews, Joseph K. Riley and others directors.

The Vicksburg City Council, Vicksburg, Miss., have unanimously agreed to accept the proposition of the Louisville, New Orleans and Texas Railway Company to locate their machine shops at that place.

The Burford Plow Company, it is reported, have purchased extensive property at Fort Worth, Tex., with a view to making their place the headquarters for the Southwest for their agricultural implements.

An annoying error occurred in the advertisement of the Hendey Machine Company, Torrington, Ct., in our June 6 issue. Dimensions of their hand and power planers should be 10 in. × 10 in. × 2 feet, instead of all inches, as stated.

A meeting of those interested in the new twist drill works at Taunton, Mass., was held recently, and considerable interest was manifested. About half of the capital stock has already been subscribed for, and the enterprise seems to be an assured thing.—*Boston Commercial Bulletin.*

The *Savannah News* says that a movement is on foot to build a railroad to commence at Silver Springs and connect with the St. John's and Lake Eustis branch of the Florida Southern Railroad at or near Lisbon, near the line dividing the counties of Sumter and Orange. The route, as projected, is to run through Emerald Island.

The Lidgerwood Manufacturing Company, 96 Liberty Street, New York, have nearly 200 men at work in their shop in Brooklyn. They are working on orders for boilers and engines for two extensive mines, one in New Brunswick and the other in Canada. Among their recent specialties is a hoisting machine for picking up submarine cables.

J. T. Granger, treasurer of the Fort Worth and Denver City Railway, writes us: "It is not our intention to erect a machine shop at Harrold, Tex. We may in the course of time put a roundhouse there to shelter our engines while they lie at that end of the road, but we will continue to keep our main terminus at Fort Worth, and do all our shop work there."

The *Chicago Industrial World* says: The force of the Ogden Engine Company has been increased, and the shops of the company are busy in automatic engine work. At a trial last week of their new automatic cut-off engine, very satisfactory results were obtained. The recent orders for these engines include one of 25 horse-power, one of 40 horse-power, and one of 60 horse-power.

The Valley Machine Company, Easthampton, Mass., have issued a new illustrated catalogue of their improved steam and power pumping machinery. The company write us: "We are building for the New Jersey Rubber Shoe Company, New Brunswick, N. J., a large fire pump, from special patterns, after the design of our Acme boiler feed pumps, and similar to the one we built last year for the Meyer Rubber Company, of same place."

The *Industrial Journal* says: A party of Massachusetts manufacturers have lately visited Rumford Falls, Me., with a view of establishing new industries at that place. They were favorably impressed with the prospect. A narrow-gauge railroad from Bryant's Pond, on the Grand Trunk, to Rumford Falls is proposed; also a fourteen-mile extension of the Rumford Falls and Buckfield Railroad to this promising manufacturing locality.

Mr. F. Benoit, 84 Market Street, Chicago, has nearly perfected a machine for quilting collar and saddle pads. The machine operates with a double-pointed needle, and sews with a continuous thread, in the same manner as hand-sewing, and can be arranged to sew with five needles at one time, which can be expanded and contracted according to the shape of the article on which the sewing is being done. With the use of this machine the expense of doing the work, it is asserted, would be about one cent per pair less, and ten dozen per day for each machine could be produced.—*Iron Age.*

George H. Austin, foreman for the bridge building works of Alden & Lassig, of Rochester, writes as follows to Henry E. Roeder, New York, in reference to work done by the Allen pneumatic riveting machine: "I wish to make a statement to you with reference to work done with your new or direct-acting air riveter. This is a record which, I think, beats all previous records in that line. On the afternoon of May 4, and the forenoon of May 6, we drove with the above-mentioned machine 6,950 good rivets (the actual number was 6,995), in ten working hours, and not one minute longer. The rivets were ¾″x2½″.

The American Trades Agency Company, having offices at Jersey City and 350 East 86th Street, N.Y., was incorporated about a year ago for the purpose of purchasing, leasing, etc., of patents and licenses of manufacture; to contract for and build machinery and apparatus connected therewith; also as a bureau of information with regard to employers and employes, and the furnishing of skilled labor. The company are possessors of several patents, including an automatic block signal, and an automatic safety lock for locomotives; the latter, it is said, has been in operation on the Pennsylvania for automatically closing the fire doors of locomotives in case of collision. The officers of the company are Martin Van Buren, President; Lewis B White, Vice President; S. H Smith, Secretary and Treasurer.

From the tin mines of the several districts of the county come the most encouraging reports, and every day adds to the certainty that the tin deposits of Pennington County are destined to furnish employment to thousands of men and vast machinery. —*Black Hills Journal.*

Philips & Garbett, of Augusta, Ga., have purchased a lot in Elberton, and will at once commence erecting a large foundry in that town. They expect to have their building up by July 1.

Machinists' Supplies and Iron.

NEW YORK, June 4, 1885.

Investigation of the state of trade in the supply business reveals puzzling features. Some large houses have done, for a month past, about as much business as during any month preceding it, while with others business has been uncommonly slow. Exceptional causes are undoubtedly the cause of this in both instances, and taken altogether there is, so far as can be seen, no change whatever. Travelers for supply houses very generally report hard times for getting orders.

Manufacturing is in very much the same condition as the supply business. Some firms are quite as busy as ordinarily, while others in the same line are unusually dull.

Iron—In American Pig the market remains dull, without change in prices. Consumers continue to buy for immediate wants. We quote: Standard Lehigh brands, No. 1 X Foundry, $18; No. 2 X, $17. Outside brands may be had at lower prices, with the tendency in favor of buyers. Grey Forge is quoted at $14.50 to $15.50.

Scotch Pig—Prices in Glasgow have declined slightly, and as a consequence the market here for lots to arrive is easier. We quote: Shotts, $20.50 to $21; Coltness, $20.50 to $21; Gartsherrie, $20.50; Summerlee, $20 to $20.50; Carnbroe, $18.50 to $19; Eglinton, $17.50 to $18; Langloan, $20 to $20.50; Dalmellington, $18.50 to $19.

Copper—The market is a little stronger, with better feelings for the future. Lake has sold at 11½c.; other brands, 10¾c. to 11c.

Lead—Prices have ruled steady at 3.60c. to 3.65c.

Spelter—Refined, 8c. to 8¼c.

Tin—There has been further advance in London, but it is looked upon here as of a speculative character. Sales here have been made as high as 19½c.

Antimony—Hallett's, 9¼c.; Cookson's, 9½c.

✻WANTED✻

"Situation and Help" Advertisements, 30 cents a line for each insertion under this head. About seven words make a line. Copy should be sent to reach us not later than Wednesday morning for the ensuing week's issue.

Position as foundry foreman by man of 35 years' experience, 20 as foreman; best references. S. W., AM. MACHINIST.

Wanted—Wood and brass pattern-makers; only first-class men need apply. The United Brass Company, Toledo, Ohio.

Situation wanted as engineer, or to erect engines and machinery; familiar with the use of indicator. T. S. R., AM. MACHINIST.

Wanted—Position as traveling salesman; well educated, 10 years' experience in iron business. Address H., care AM. MACHINIST.

Wanted—Immediately, a first-class man in every respect, fully competent to act as foreman in charge of shop for building tools and machinery. Address B., BOX 4, AM. MACHINIST.

If you want first-class machinist and toolmaker as superintendent or foreman on light machinery, address me. Highest references. "E.," 653 W. Harrison Street, Chicago, Ill.

Wanted—Situation for a competent engineer and draftsman; office, or charge in manufacturing concern; unexceptionable references; four years with last employer. Address C. H., AM. MACHINIST.

Wanted—Situation by first-class pattern-maker, experienced in gearing, machinery, engine and mill work; is good draftsman and capable foreman; highest references. Address Box 3, AM. MACHINIST

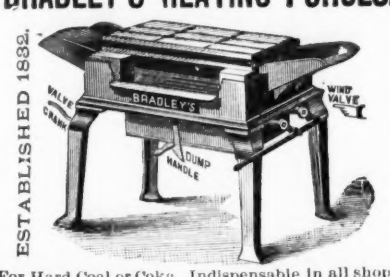
For Sale—Horizontal engine castings, 1"x2", with patterns. Address C. A. Healey, Hoboken, N. J.

To make room for larger tool, will sell cheap, for cash, a planer 42"x42"x12', in good order. Address P. O. Box 2085, Bridgeport, Conn.

For Sale—A Crosby Improved Nickel-Plated Indicator, with 40 and 50 Springs and scales; been used but a short time, and in first-class condition. Price, $65, cash. Address Box 2, AM. MACHINIST.

CHANDLER & FARQUHAR,
168 Devonshire St., Boston, Mass.,
AGENTS FOR THE
Barnes' Wood and Iron-Working
MACHINERY,
Lathes,
SCROLL and CIRCULAR SAWS,
UPRIGHT DRILLS, MORTISERS, &c.
Machines sent on Trial.
Also Dealers in Supplies & Tools for Mechanics & Amateurs.
SEND FOR CATALOGUE B.

BRADLEY'S HEATING FORGES.



For Hard Coal or Coke. Indispensable in all shops to keep **Bradley's Cushioned Hammers** and men fully employed, and reduces cost of production.

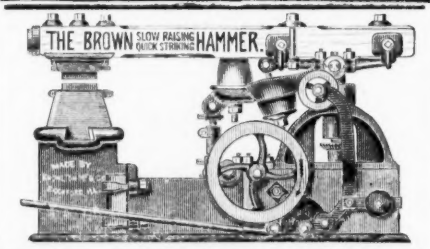
BRADLEY & CO. Syracuse, N.Y.

SPECIAL NOTICE.

All parties making, selling or using an Upright or Heave Power Hammer having a Cushioned Vibrating Saddle, infringe our patents, and we shall hold them legally liable for the same.

BRADLEY & COMPANY, Syracuse, N. Y.

Massey's "E" AND "K" PATENT VISES
HEAVY CHIPPING CAN NOT LOOSEN GRIP
T. C. MASSEY
SOLE MANUFACTURER
EASTERN DEPOT LINK-BELT CO. No. 81 JOHN ST. N.Y.
CHICAGO ILLINOIS
WRITE FOR DESCRIPTION
SIMPLY CONSTRUCTED AND DURABLE
NO LOST MOTION



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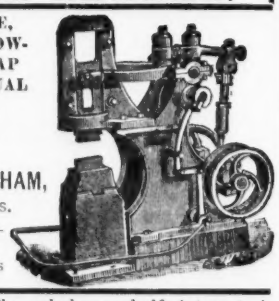
STRIKES A BLOW WITH
DOUBLE THE VELOCITY That it Raises the Hammer.
A NEW MOVEMENT! SEND FOR DESCRIPTION.
KNOWLTON MFG. CO., King St., Rockford, Ill.

The Fireman's Guide.
A Handbook on the
CARE OF BOILERS
By KARL P. DAHLSTROM, M. E.
Crown 8vo, Cloth, 50 Cents.
E. & F. N. SPON, 35 Murray St., New York.

BEAUDRY UPRIGHT
POWER HAMMER.
NEW, SIMPLE, PRACTICAL, LOW-PRICED, CHEAP TO RUN, EQUAL TO STEAM.
TEN SIZES.
BEAUDRY & CUNNINGHAM,
Boston, Mass.
Prices, etc., on application.
Please mention this advt.



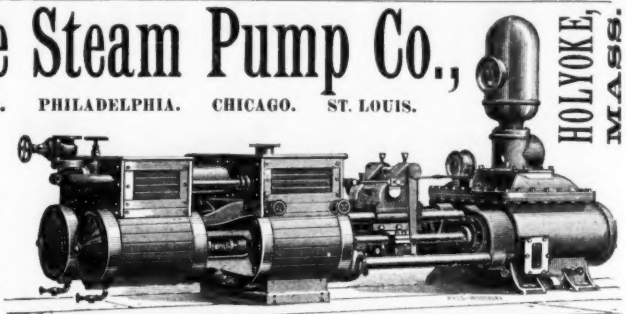
FOR SALE.—The whole or half interest in STEAM and GAS FITTING business, established thirty years. Fine opportunity for a manufacturing concern to establish a branch, or a practical man to secure the good will of an old business without bonus. Present owner unable to look after it. Best stand in Connecticut. Stock and tools inventory $15,000. Favorable terms to right party. Principals only need address, SIDNEY A. SANDERSON, New Haven, Conn.

STEPHENS PATENT PLANER CHUCKS

Combine valuable features offered by no other tool. In range of opening; advantage of self-adjusting jaw worked by a single screw; graduated base, etc. Parts interchangeable. Chucks guaranteed. Sold by the trade. Send for Catalogue.
Self-Adjusting. MELVIN STEPHENS, Prop'r, Office, 41 Dey Street, New York.

J. C. HOADLEY,
CIVIL AND MECHANICAL ENGINEER
and Expert in Patent Causes.
48 STATE STREET, ROOM 26, BOSTON, MASS.

The Deane Steam Pump Co., HOLYOKE, MASS.
NEW YORK. BOSTON. PHILADELPHIA. CHICAGO. ST. LOUIS.
MANUFACTURE
PUMPING MACHINERY
FOR ALL DUTIES.
Send for New Illustrated Catalogue.



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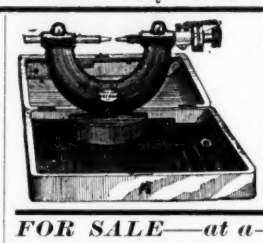
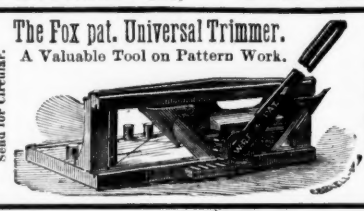
24 and 26 West Street, Cleveland, O.
101 Chambers Street, New York.
85 Queen Victoria St., London, Eng.

SPECIAL INDUCEMENT
Second-hand Machinery For Sale.
THE NASON MANUFACTURING COMPANY
HAVE A NUMBER OF
IRON WORKING LATHES
to dispose of, and are offering them at very low figures. Enquire at
71 Beekman St., NEW YORK.



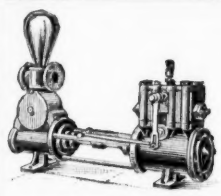
Prof. J. E. Sweet's
MEASURING MACHINES.
Capacity 4 and 6 in.
A reliable standard for machine shops.
Circular on application.
Syracuse Twist Drill Co.
SYRACUSE, N. Y

The Fox pat. Universal Trimmer.
A Valuable Tool on Pattern Work.



CUTS SQUARE or ANY ANGLE. Send for Circular.
W. R. FOX, Grand Rapids, Mich.

FOR SALE—at a—BARGAIN.
BROWN & SHARPE MFG. CO., NEW TOOLS.
ONE Small Universal Milling Machine.
16 in. x 7 ft. bed Engine Lathe, Taper Attachment.
Cast Iron Grindstone Frame.
Wells Bros.' 6 in. Cutter Grinder.
Address, W. E. LEWIS, CORRY, PA.



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STEAM PUMPS,
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SEND FOR CATALOGUE.

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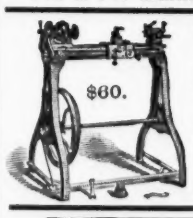

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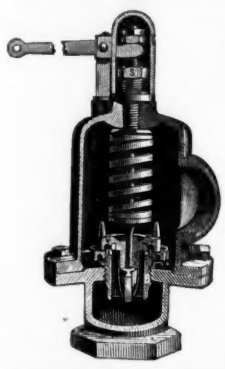

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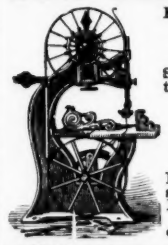

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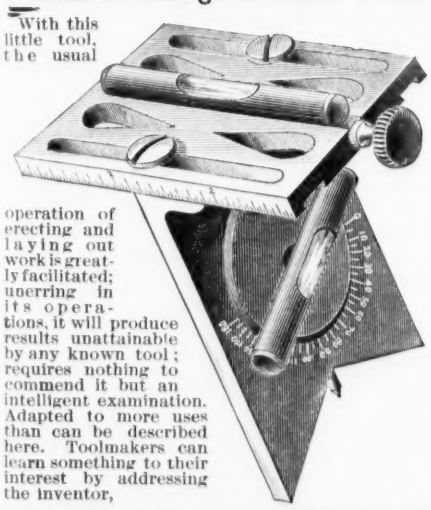

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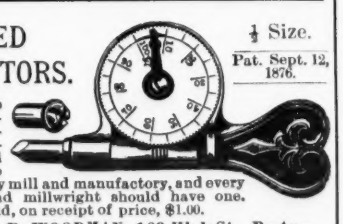

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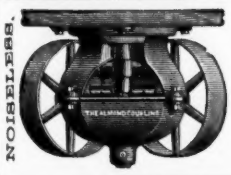

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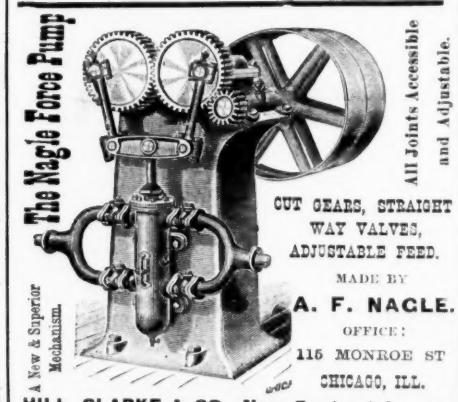

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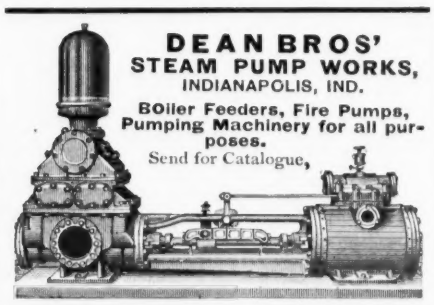

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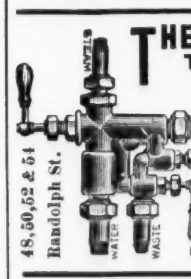

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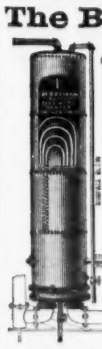

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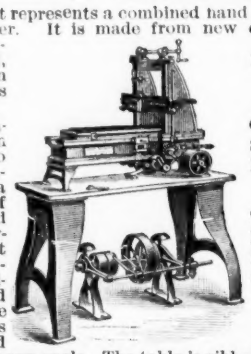

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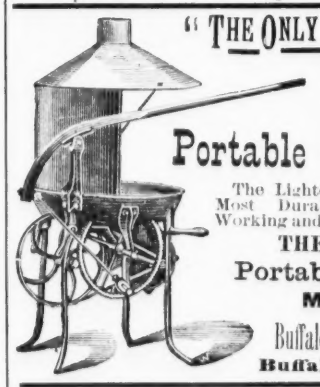

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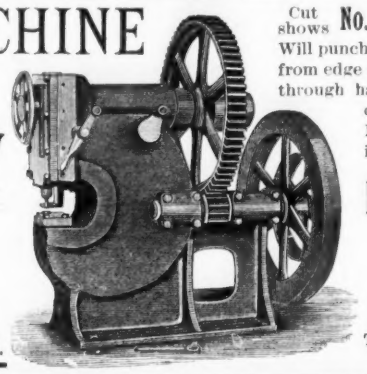

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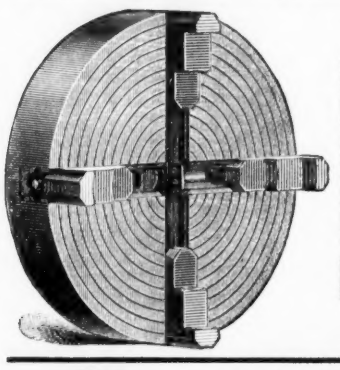

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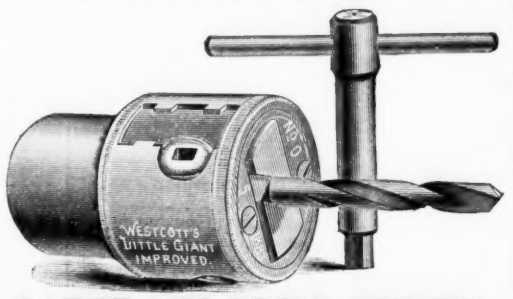

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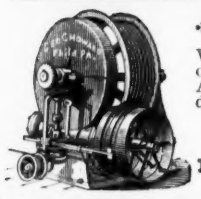

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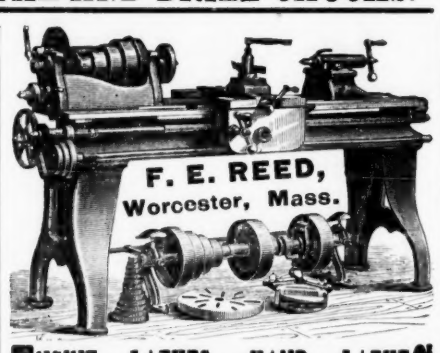

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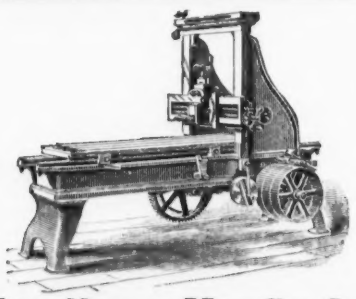

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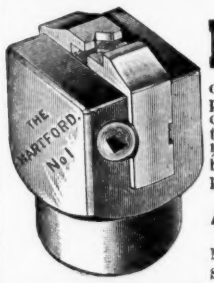

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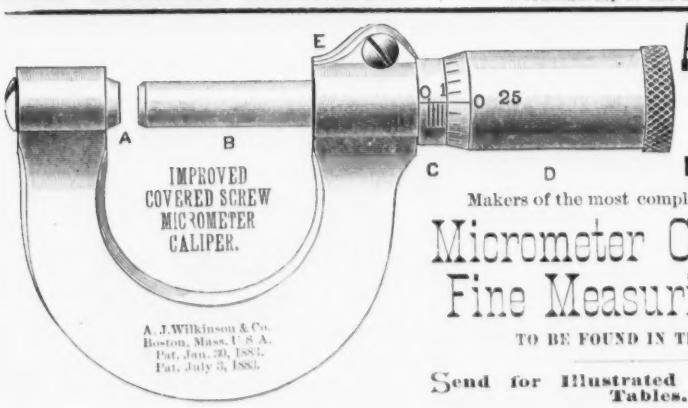

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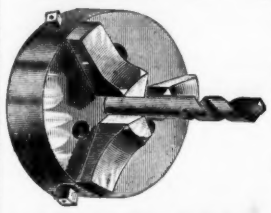

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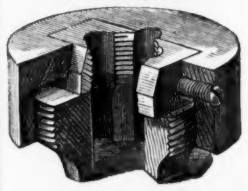

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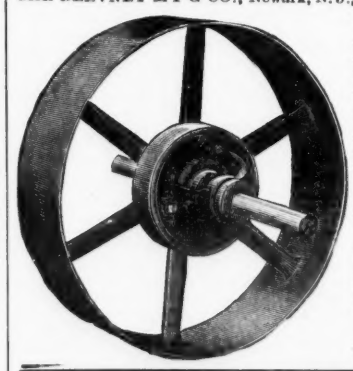

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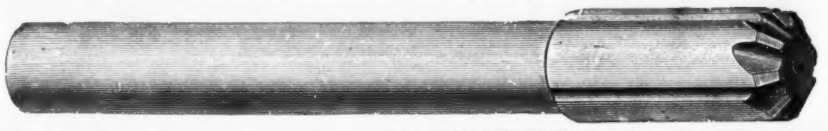

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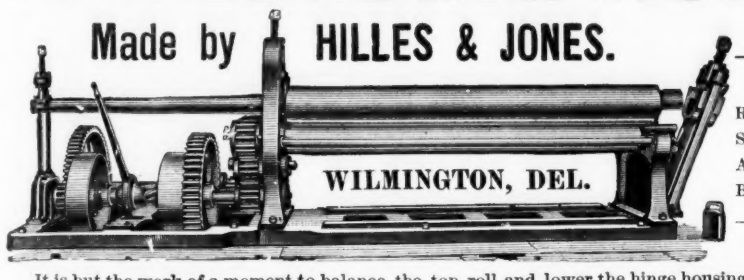

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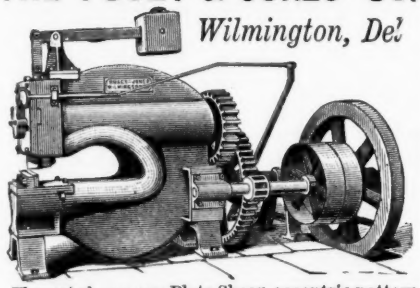

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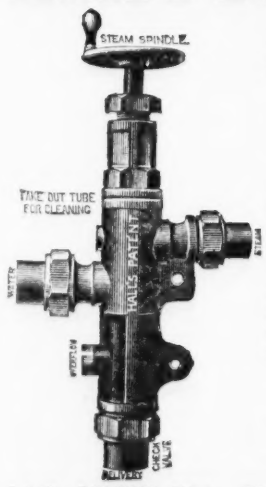

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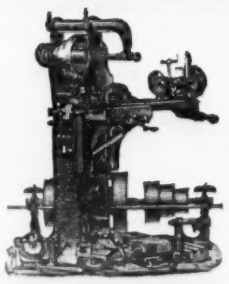

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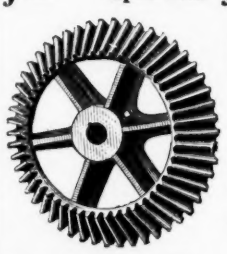

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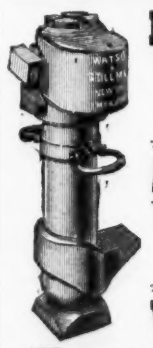

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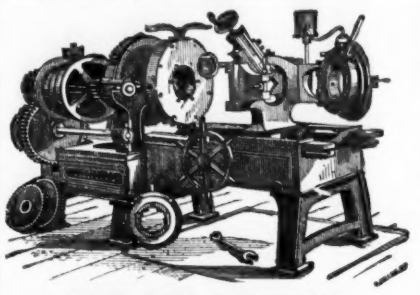

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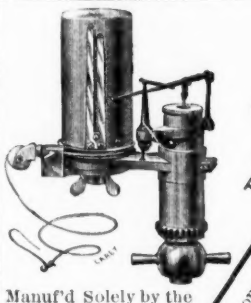

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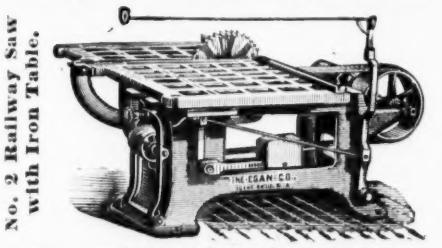

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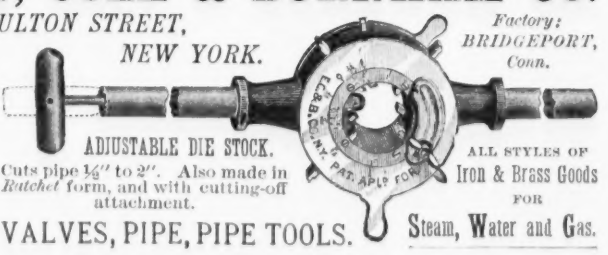

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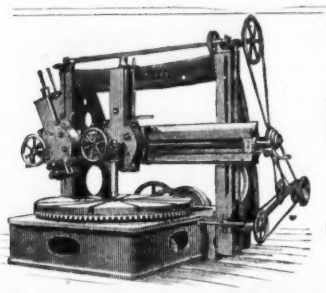

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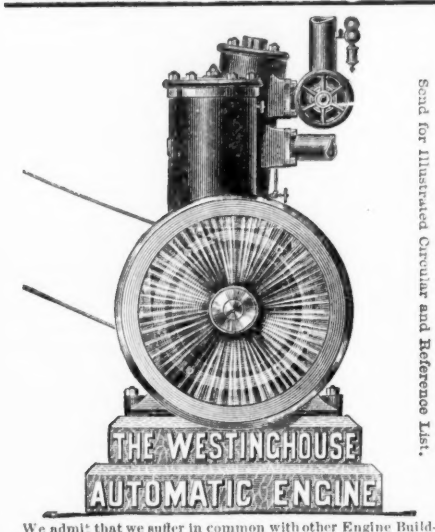

Send for Illustrated Circular and Reference List.

We admit that we suffer in common with other Engine Builders from the general business depression. We are willing, nevertheless, to publish the List of Orders received during the month just closed, not for their number, but as indicating the expressed confidence of the public, even in hard times. The list represents a little over one-half our monthly capacity.

List of Sales for May, 1885.

Badger Electric Light Co.	Chicago, Ill.	160 H.P.
" " " (2d order)	"	160 "
Oliver Oil Co.	Columbia, S. C.	150 "
A. A. Andariese	Chicago, Ill.	125 "
Geo. B. Sackett, Irrigation	Berlin, Wis.	125 "
" " " (2d order	" "	125 "
Arbuckle Bros. Coffee Roasters, (2d order)	Brooklyn, L. I.	125 "
Church, Utley & Co., Paper Mill,	Rock Falls, Ill.	100 "
Delta Lumber Co., Saw Mill,	Thompson, Mich.	100 "
Union Switch and Signal Co. (4th order)	Pittsburgh, Pa.	75 "
Brussels Tapestry Co.	New York,	75 "
Eau Claire Water Works	Eau Claire, Wis.	75 "
" " " (2d order) "	" "	75 "
Richardson & Heins, Planing Mill	Kansas City, Mo.	75 "
J. C. Reagan, Electric Light	Omaha, Neb.	60 "
" " " (2d order) "	"	60 "
Jones, Denton & Co., Contractors,	Yonkers, N. Y.	60 "
" " " (2d order) "	"	60 "
G. Vollmer & Son, Furniture	Philadelphia, Penn.	60 "
Pennsylvania Steel Co. (6th order)	Steelton, Pa.	50 "
Ryan Hotel, Electric Light	St. Paul, Minn.	50 "
Town of Union Silk Mills	Union Hill, N. J.	50 "
M. Brand & Co., Brewery	Chicago, Ill.	45 "
Duluth Electric Light Co.	Duluth, Minn.	45 "
" " " (2d order)	"	45 "
A. G. Davison, Flour Mill	Solomon City, Kas.	35 "
Fiske, Thomas & Co., Elevator	Chicago, Ill.	35 "
Lowell Mfg. Co., Saw Mill	Lowell, Mich.	35 "
Gibbons & Henry, Saw Mill	Granville, Mass.	35 "
Lima Paper Mills	Lima, Ohio.	25 "
J. H. Oldham, Ginning	Greenwood, S. C.	25 "
Griffin & Wilkinson, Ginning	Fort Mill, S. C.	25 "
Chicago, Rock Island & Pacific R.R.	Chicago, Ill.	25 "
Brown Seamless Metal Co.	Cleveland, Ohio.	25 "
Imperial Guano Co., Fertilizer	Norfolk, Va.	25 "
P. Clement	Corvilliers, France.	25 "
F. E. Averill	Delft, Holland	25 "
Fred. W. Wolfe, Ice Machine	Weatherford, Tex.	25 "
Green & Bro., Hat Factory	Danbury, Conn.	25 "
Frank Burt, Threshing	Kalamazoo, Mich.	15 "
Dean, Sickler & Briggs	Peabody, Kan.	15 "
Jones, Denton & Co., Elec. Lgt. (3d order)	Yonkers, N. Y.	15 "
Jones, Denton & Co., Elec. Lgt. (4th order)	Yonkers, N. Y.	15 "
M. R. Muckle & Co., M'hine Shop	Phila., Pa.	15 "
R. M. Bingham & Co., Hardware	Rome, N. Y.	15 "
Oliver Oil Co., Elec. Lgt (2d order	Columbia, S. C.	10 "
A. R. McNeil, Farmer	Old Fields, W. Va.	10 "
E. W. McNeil, Farmer	Moorfield, "	10 "
A. M. Inskeep, Farmer	" "	10 "
H. V. W. Meyer, Farmer, (2d order)	Madison, N. J.	4 "
Humeston & Shenandoah R. R.	Humeston, Ia.	4 "
Tippecanoe Paper Co.	Tippecanoe, Ohio.	4 "
Total, Fifty-two Engines		2,682 H.P.

SOME FACTS.

Up to May 1st, '85, TWENTY-ONE PER CENT. of our sales have been bona fide REPEATED ORDERS (2 to 12) from actual users (not agents) and do not include about twenty five exchanged engines, all of which are counted as single sales. About half the exchanges were from defective engines, the balance for increased power or automatic cut-off, the difference being paid in many cases. Nine engines (our earliest) were thrown out altogether. This is our record, with about 1,500 engines running.

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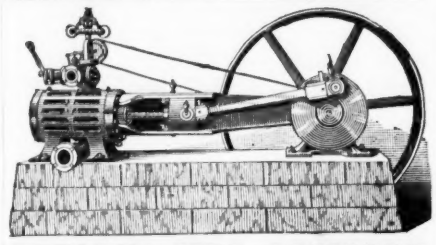

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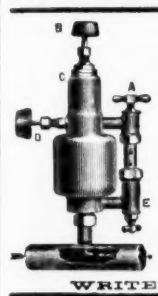

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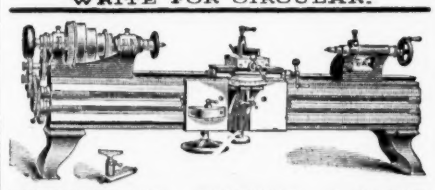

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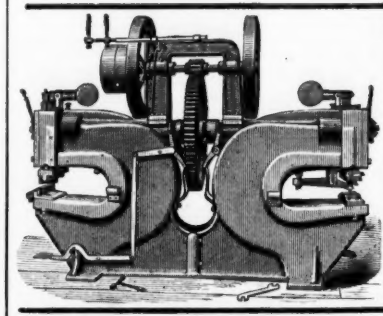

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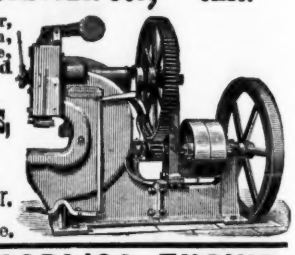

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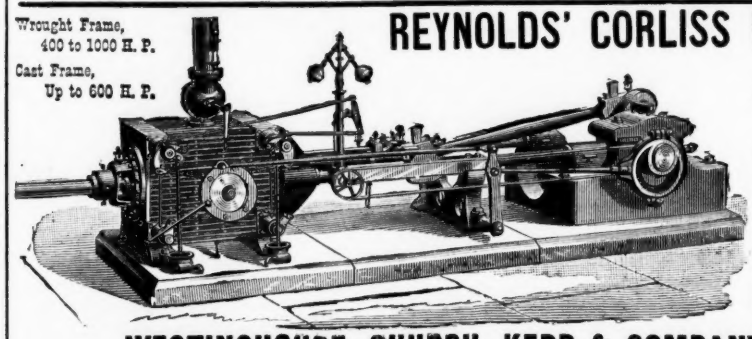

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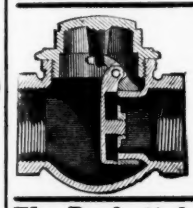

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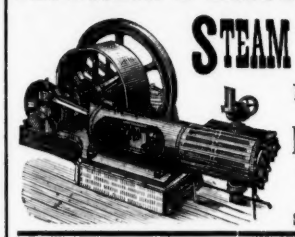

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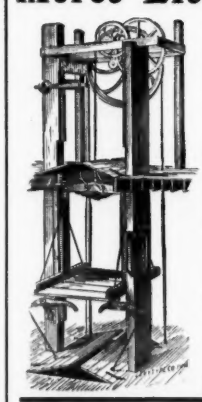

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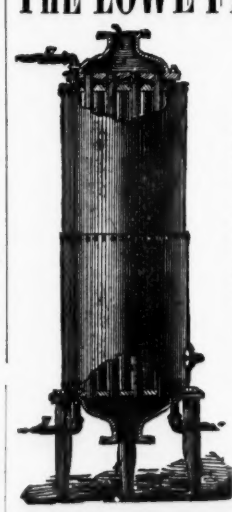

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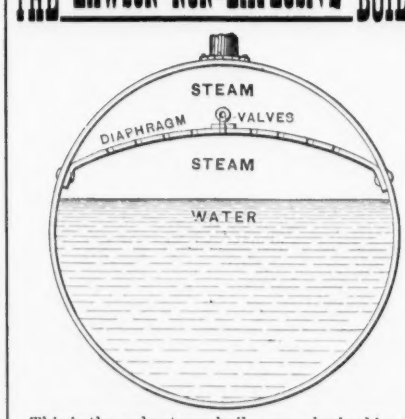

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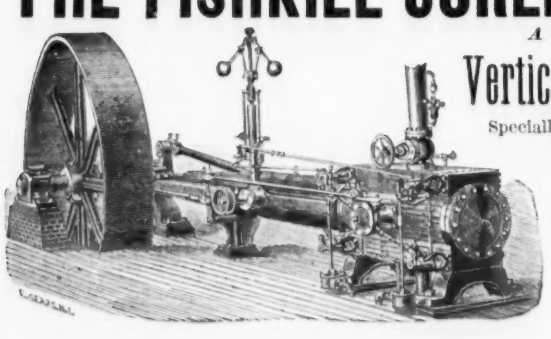

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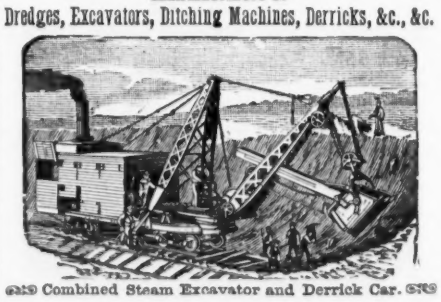

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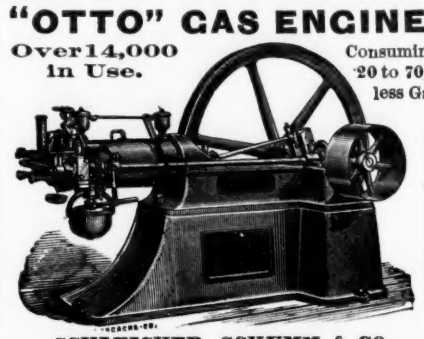

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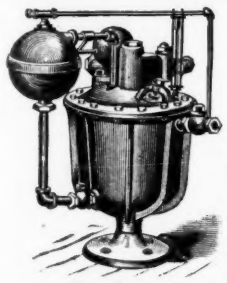

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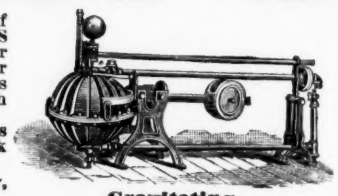

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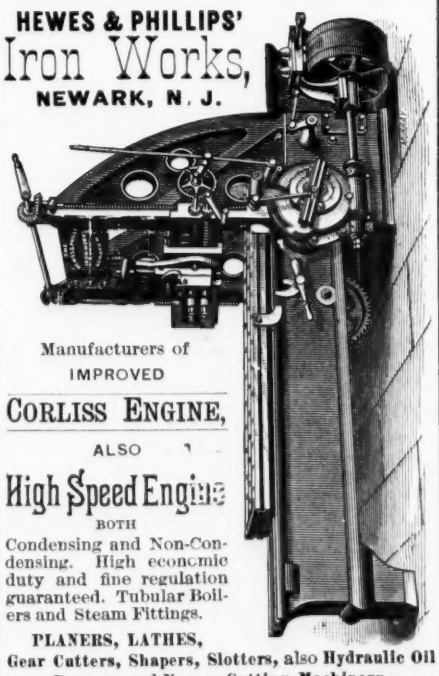

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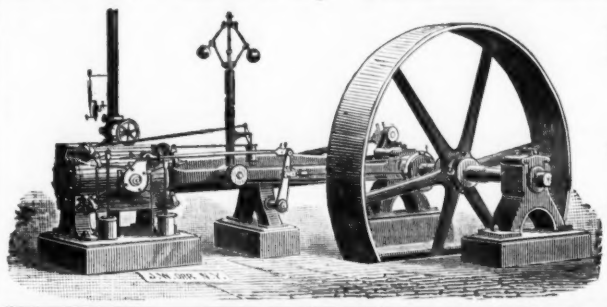

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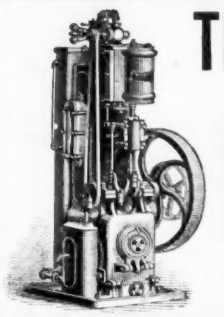

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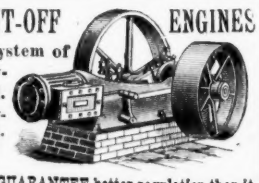

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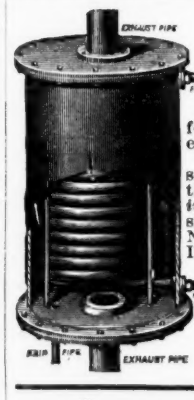

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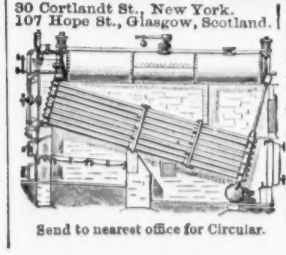

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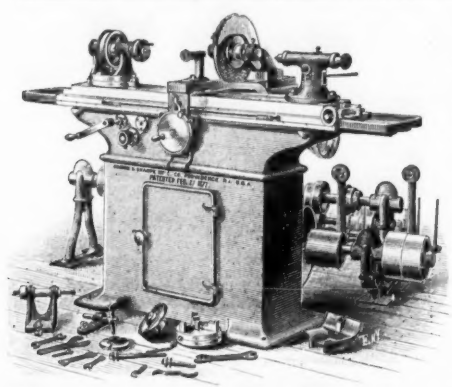

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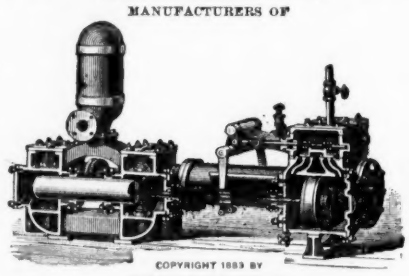

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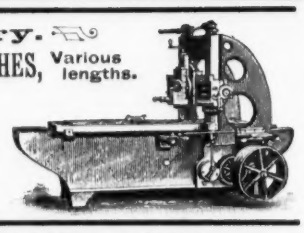

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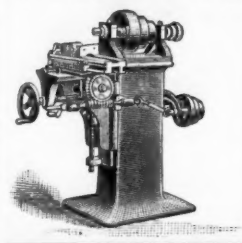

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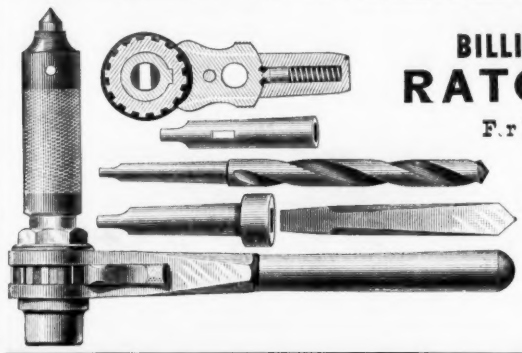

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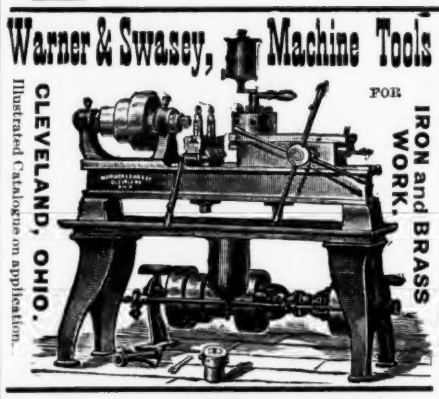

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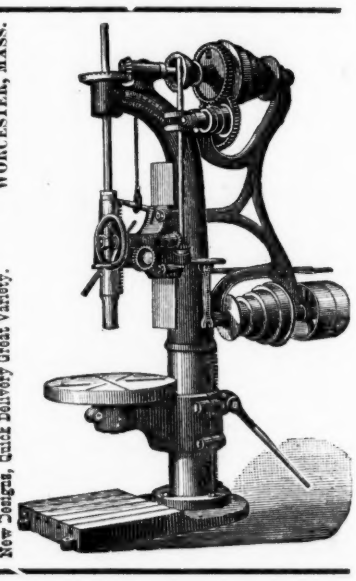

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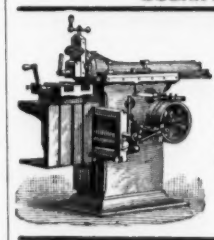

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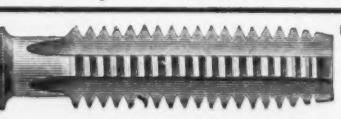

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